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Wanted— An Obsolescence Insurance Company!

Obsolescence should be cared for by insurance and should not be figured as depreciation. An economist speaks vigorously to management and accountancy

By Gorton James

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OBSOLESCENCE is not the equivalent of depreciation. Words do not always mean what they seem, and "obsolescence" seldom means what it seems. Obsolescence and depreciation are two entirely different things. And today, with so much attention being given to them in connection with valuations and costs, in connection with mechanical improvement, in connection with the declaration of dividends, these terms should be better understood.

Depreciation is the mechanical wearing out of machines, or equipment, or buildings. A machine wears out because of use, misuse, abuse, or disuse. A good engineer can approximate very closely how long it will last, and how much longer it will last if carefully used and well maintained.

Obsolescence, on the other hand, is a sudden wiping out of the value of machines or equipment, or buildings, because something else, which can do the job better, has come into being. No one can estimate that. It may happen tomorrow, or it may never happen throughout the life of a machine.

The writing off of value on the books of the company is a proper way to calculate depreciation. As the machine wears, and thus depreciates, it becomes less and less valuable, and the write-offs should keep its figure on the books somewhere near its actual value.

But no one would think of writing off the value of a building because it might burn down. A building does not decrease in value because of that hazard, unless it actually does burn. Similarly there is no decrease in value of a machine because it might become obsolete. In fact, decreasing its book value tends to hide its obsolescence. The measure of its operating cost has been arbitrarily reduced, and is not the true cost which should be compared with that of the new machine.

In one textile mill, for example, where automatic looms had never been installed, it was thought that unit costs of cloth on the new machines would be greater than actual book costs obtained by the company's cost department. Investigation revealed that the value of the old looms had been reduced on the books, at conservative depreciation rates indeed, until the entire equipment stood

practically at scrap value. Such values for cost figures naturally resulted in unnaturally low unit costs. Cloth was produced, as it were, without equipment. Of course, it was difficult to show that expensive new equipment, however efficient, labor saving, and cost lowering, could produce cloth at lower apparent costs than no equipment at all. The figures fooled both the accountants and the management.

No wonder that many executives have failed to recognize the necessity of replacing obsolete machinery. Many accountants have unwittingly been fooling them regarding the true cost of their manufactures and the true value of the machines they are operating. Executives point with pride to the fact that they have written off the entire cost of their plants, that their books show their plants at zero or at scrap value. Proudly they tell how they are really manufacturing without a factory.

It all sounds like a fairy story, and it is. Many book figures have less relation to facts than fairy tales. Executive acts based on erroneous figures are loaded with high explosives.

How, then, should obsolescence be handled? How can it be measured and recognized?

The measure, of course, is in the cost figures. If a new machine can produce the same article more cheaply than an older machine, and if there is no way of offsetting the difference, the older machine is obsolete, whether it is one week old or twenty years old. Into the machine cost must enter the interest on its value and its depreciation, the cost of power, labor, and supervision, repairs, maintenance, light, and floor space rent, plus its share of all other items involved in operation. Many of these factors are changed if distorted machine value is used as a basis for computation. An executive fools himself badly if he uses any depreciation rates higher than those representing mechanical wear.

This is a startling thought when applied to the problem of railroad valuations. But, after all, the celebrated O'Fallon case has been decided by the Supreme Court and has been thrown back to the Interstate Commerce Commission with instructions to give consideration to "present value."

There is only one way for owners to protect themselves against obsolescence and that is to insure their equipment against obsolescence as they would against fire. But, though there are hundreds of fire insurance companies, we have yet to be solicited for obsolescence insurance. Unfortunately we still lack a recognized measure or indicator of obsolescence and we do not know the extent of obsolescence losses.

Fire insurance rates are based upon official reports of fires throughout the entire country. With such data, fire loss variations in any one city are lost in the general average for the country. Unless there is a major disaster like that of the San Francisco earthquake, the average total fire loss of the whole country varies little from year to year. The insurance companies can safely base their rates on the country's averages for each type of construction.

So should it be with equipment obsolescence. Similar data must be collected on obsolescence before officially recognized rates can be established—collected in large volumes on each type of machine. Fortunately, the United States Department of Commerce has made a start in the gathering of such data for the two-fold purpose of developing a measure of obsolescence and of establishing a tentative rate on a few standard machines. Eventually, industry can hope for official data, but it must wait a long time.

Meanwhile, however, it is possible for any concern to insure its own obsolescence hazard as many insure their own fire hazards—on rates and by reserves of their own. In industries where rapid mechanical change is taking place, obsolescence rates naturally must be higher.

As an illustration, airplane design is changing rapidly, so rapidly, in fact, that attention is concentrated mainly on the design of the airplane itself. Because of the rapidity of change, manufacturers dare not tool up heavily with special purpose machinery. The rate of obsolescence on airplanes themselves is high—33⅓ per cent and even 50 per cent being not unreasonable; the rate of obsolescence on the machinery which makes them, 10 to 20 per cent, is low—lower than it will be later when airplane design becomes stable and manufacturers can turn their attention to refinements of equipment design.

In the textile industry, on the other hand, during the fifty years from 1860 to 1910, the average equipment obsolescence rate was under 2 per cent. Practically no radical changes took place to make former machines obsolete. Since 1910, however, inventors of improved textile machinery have awakened, and the textile industry has been suffering its first real experience with obsolescence. It would have suffered much less if book values had been true values, if obsolescence had not been confused with depreciation.

All obsolescence should be cared for by insurance, and industry must recognize it. Wanted: a sound, reliable obsolescence insurance company.

Keeping a Line on Tools

By Frank V. Faulhaber

IT PAYS to have certain employees in the machine shop take particular interest in tools. A good plan is to keep a special record book in which all important data relative to tools can be recorded. This applies to machine parts as well as to hand tools. When a purchase is made there should be entered in the book information as to the maker, the source of purchase, price, kind, use, and, in fact, all such data as may be needed later. When a given tool purchase is contemplated, this ever-handy record book will prove exceedingly useful, and will eliminate much guesswork. In the book should be found information as to which tools stand up, and why. It will be possible to determine readily why certain tools should or should not be purchased again.

If the toolmaker, for instance, helps to keep such a record, he will have a better line on his tools, and will be certain to show more interest in keeping them in good condition. Aside from its general every-day usefulness, a handy record book ensures more profitable and more satisfactory tool purchases, makes for more efficiency, and inspires more regard for tools and for the work that is being produced.

Tools for machining aluminum castings, turning, drilling, milling, and planing should have acute turning angles as compared to brass cutting tools. High speeds and light cuts are recommended. The cutting edges should be finished with an oil stone for fine work. Twist drills should have cutting edges ground without front rakes

Small Meter Gears

By Frank J. Oliver, Jr.
Associate Editor, American Machinist

The tooth contours are checked against master forms by means of a special projection apparatus

ONE ESSENTIAL requirement of small brass gears used in the register train of a watt-hour meter is that they operate with a minimum of friction, and that the slight friction present be uniform throughout the cycle of any one set of gears. This requirement necessitates the manufacture of the gears to within rather small limits of accuracy, since a slight variation becomes important in a tooth 0.025 in. or less in thickness.

The operations about to be described are performed at the Newark Works of the Westinghouse Electric and Manufacturing Company. Although a gear production close to 10,000 a day is maintained, it is surprising to find that few machines of any one type are necessary, and these are fairly simple in construction and operation.

In the first operation, the gear blank is punched from sheet-brass on a punch press, a sub-press die, such as the one shown in Fig. 1, being used. The construction

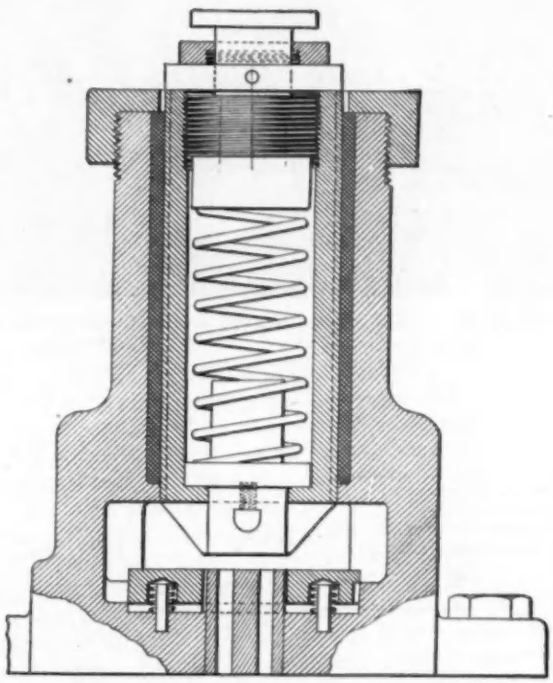


Fig. 1—Typical sub-press die used in blanking small brass gears for a watt-hour meter register train

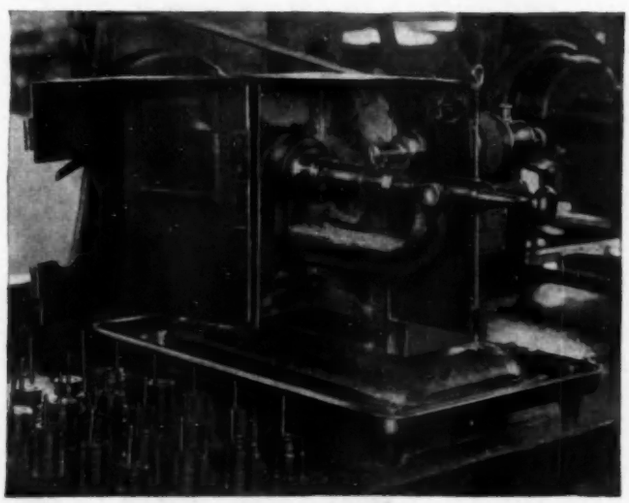


Fig. 2—Typical machine for cutting teeth in small brass gears

varies little from standard practice. The ram travels in the babbitt bearing in the frame which has spiral grooves for lubrication. Four vertical grooves in the ram engage projections in the babbitt lining, and assure the punch registering with the die below. As is generally done in clockwork jobs, the blank is not punched through entirely, so that the stripper plate can push the punched piece back into the strip for convenience in handling. These gear blanks are separated from the strip later by hand. The same sub-press die simultaneously perforates the space between the spokes of the gear wheel, but the center is left solid, being punched out in a later operation.

A stack of these blanks is assembled on a mandrel or arbor which passes through the space between the spokes. Sleeves are used to space the blanks on the arbor, and the clamping nut has a center for use in supporting the unit on centers in the following two operations. In the first, the blanks are turned to a uniform outside diameter in a bench lathe employing hand feed on the tool. In the next operation, gear cutters are used to cut the gear teeth. This operation is performed in a simple gear cutting machine having a fixed cutter arbor. The work arbor is provided with a traversing motion and a suitable means for indexing.

One gear out of each stack is carefully examined for tooth form by means of a projection apparatus. Fig. 3 shows the operating position of the unit and gives an idea of the enlarged image thrown on the ground glass

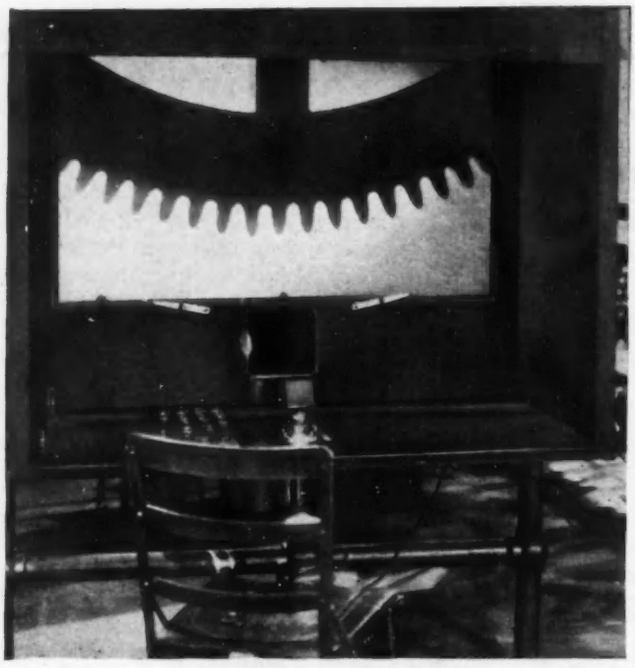


Fig. 3—Projection apparatus used to examine the tooth contours of small gears. The magnification is 100 times

again conserved by doubling the light rays back with the aid of a mirror and prism.

Further check upon the accuracy of the gears is obtained during the assembly of the gear train. As each gear set is added to the train, the whole is spun to see that the gears revolve without undue friction. Improper meshing conditions will show up at once.

Once the gear teeth have been cut, the center is punched out for the insertion of the hub piece in the following operation. This punching is done in a punch press while the gear is held in a gage the inside diameter of which closely fits the outside diameter of the gear so as to center it accurately. In Fig. 5 is shown the small drop press used to stake the hub. As can be seen in the illustration, the drop weight is raised by a single-rise radial cam, bearing against a roller attached to the weight arm. The simple means of stopping the press in the raised position, and the method of tripping the locking arm and lever, can also be seen.

The hub used is solid, and is drilled at a later operation. In the general layout of these and similar gears, the important point is to have the pitch line run concentric with the shaft. It is to accomplish this purpose that the center hole of the gear is punched in a separate die and registered from the outside of the teeth. The hub is afterward drilled in a jig registering from the same place in order to maintain the concentricity.

Fig. 4 — Diagram showing the path of light rays in the projection machine shown in Fig. 4. Only a part of the magnified field is shown upon the screen

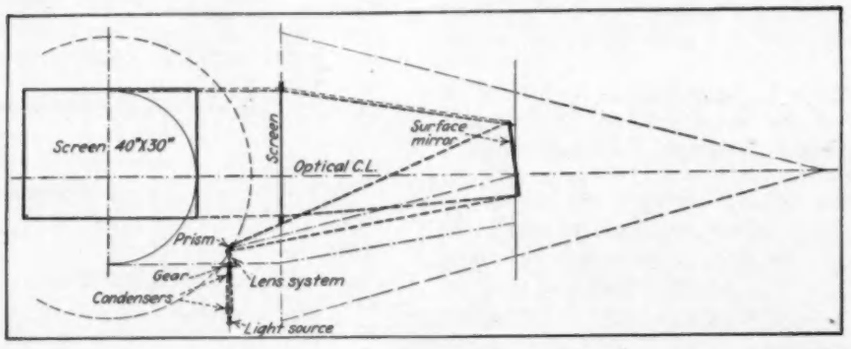


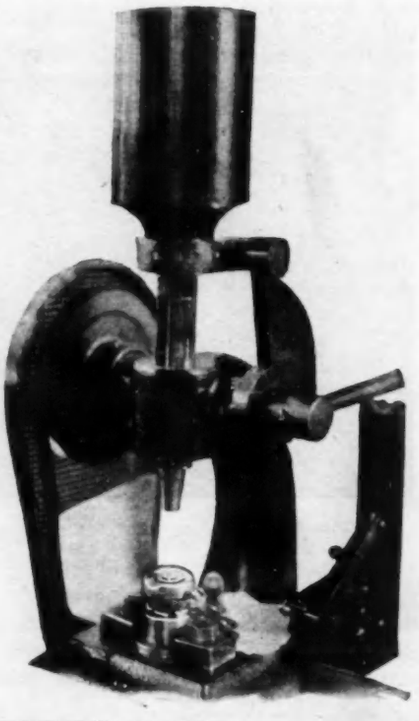
Fig. 5—Small drop press used to stake the hub of the gear. The weight member is elevated by means of a single-rise radial cam

screen. In this case, the gear being examined is about 1 in. in diam. and has about 100 teeth. The shadows of the contours are matched against master contours drawn on the screen. Each particular gear has its own master form registered on glass sheets which are actually photographic glass plates of extra large size. The master curves are produced by photographing carefully-prepared drawings. The glass sheets, are stored in a cabinet close to the projection apparatus.

As Fig. 3 also shows, the light source is placed directly under the examining table. In order to obtain sharp definition on the screen it is necessary to use a lamp of concentrated filament, in this case a 6-volt, 18-amp. lamp, in conjunction with a suitable condenser lens. Fig. 4 shows the path of light rays in diagrammatic form. The gear to be examined is placed upon a glass plate interposed between the condenser and the lens system which consists of a Bausch & Lomb 32-mm. Micro-Tessar lens with a 15-mm. field. Only a part of the magnified field is utilized upon the screen in order to limit the physical dimensions of the screen to 30x40 in. and, at the same time, retain the full magnification. Light dash lines are used in Fig. 4 to indicate the full field of the lens projected back in a straight line to the focal point. In the instrument itself, however, space is

The gears are completed by being bright dipped or given a light gold plate, depending upon the type of service. A very light gold plate is sufficient to prevent oxidation, even in the damp atmosphere found in the usual cellar. Two minutes in the plating tank is all that is necessary.

The anodes used are 18-K. Contrary to the popular idea, gold plating is not expensive. It covers better



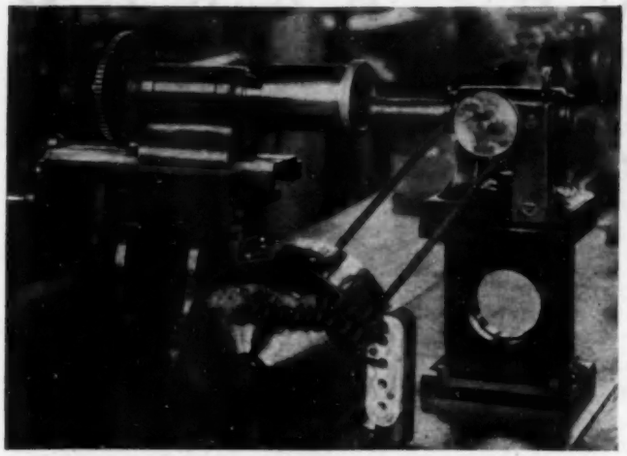


Fig. 6—Machine for cutting small internal gears. The work is traversed while the cutter is rotated on a fixed axis. A roller chain is used to drive the cutter spindle

than other metals and, therefore, less metal is required. A pennyweight of gold, valued at about a dollar, will wash plate about a thousand gears of the size mentioned.

Another design developed by the Westinghouse plant is that of a machine for cutting internal gears. It is shown in Fig. 6. The cutter is supported on a fixed arm and is driven by a roller chain from a sprocket in the head which, in turn, is belt driven from the motor. The sprockets are as small in diameter as the roller chain will stand.

A stack of annular rings from which the gears are cut is clamped in the chuck which is fed into the cutter. This special chuck is carried on a spindle that has an indexing disk on the other end. Indexing is done by hand at the end of each stroke.

Cooling a Hot Bearing

By W. F. Schaphorst

THE following is a method of cooling a hot bearing I once saw successfully applied in a large plant: Several ordinary house fans were made to blow air against a bearing that was inclined to heat. Air is better than water for cooling bearings, in that it does not mix with or disturb the oil in any way, consequently lubrication is maintained at its most efficient point, considering the handicap. With the fans in use, the temperature of the bearing would go up to about 110 deg. and stay there, whereas, before the fans were employed the bearing would get so hot that it would smoke.

FOR non-destructive tests of welds of small vessels, plates, and drums, a stethoscope of the ordinary physician's type has been used. The stethoscope had a gum rubber tip to exclude extraneous sound and give contact on the irregular surface of the plate as well as to minimize damping of the oscillations at the contact of stethoscope and metal. The method is analogous to the one used in the well-established method of testing staybolts by noting the character of the sound on striking. The stethoscope is utilized to overcome difficulties such as forced and natural vibrations of the tank and the tendency for the natural vibrations to drown out all other sound.

Safety Practice for Conveyors

METHODS of preventing accidents in the operation of conveyors are covered in a pamphlet entitled "Conveyors—Safe Practices Pamphlet No. 35," published and distributed by the National Safety Council, 108 East Ohio St., Chicago, Ill. The pamphlet is a compilation of experiences in accident prevention, but not a summarization of federal, state, or insurance requirements and national safety codes.

The pamphlet recommends inclosing conveyors where persons may be caught in operating parts, urges crossovers so that workmen will not be tempted to step on the conveyor to get from one side of the room to another, and suggests screens beneath conveyors that travel overhead, so that materials falling off may be caught and not strike workmen on the head. Guards for driving parts, control devices for stopping conveyors at convenient points in cases of emergency, frequent inspections of equipment, provision of rubber mats or other anti-slip floor surfaces at the loading and discharging stations, and safe methods of loading and unloading conveyors are also covered.

Chute conveyors should have warning signs so that workmen will guard against having their hands mashed by descending material. Driving mechanisms of belt conveyors should be carefully guarded, and workmen should be cautioned against attempting to clean such conveyors while they are in motion. Loading hoppers for belt conveyors should be held securely in place to prevent them from touching the belt. Trippers should not be freed from congested material while the belt is in motion, and, where self-propelled by the action of the belt, should be provided with a device to throw the mechanism into neutral at each end of the runway. Belt tensions not exceeding 24 lb. per in. per ply are recommended, with an extreme limit of 36 lb. per in. per ply for temporary service. Belt speeds up to 300 ft. per min. are recommended for belts under 16 in. in width, while belts from 16 to 24 in. in width may be run at 450 ft. per min. maximum speed. With wider belts a speed of 600 ft. per min. is permissible. Belts for carrying packages are frequently run no faster than 60 to 100 ft. per minute.

The chief points of danger with chain conveyors are accidents from return chains or cables. It is unsafe to step on the conveyor while it is in motion, or to start the conveyor while a man is on it. The hazards in the use of flight conveyors are similar to those with ordinary chain conveying equipment.

With screw conveyors the dangers are that persons will get their hands or feet caught in the screw, and that, where the conveyor is located at floor level, someone may step in it. Driving gears are also a source of danger unless inclosed.

With the pneumatic tube and blower system the chief danger is fire hazard. Aerial cableways offer a hazard in that material may fall from them onto someone walking below. A covered passageway, or a heavy screen beneath such conveyors, removes the hazard.

Lard oil is now used as a compounding and emulsifying medium in lubricating oil for marine Diesel engine air compressor service, where condensation during standby oftentimes leads to rusting and corrosion of the cylinder surfaces.

EXECUTIVE · FORUM

Making a Manager Out of a Foreman

"WHAT do you think of allotting each foreman a certain sum each month on which to run his department, paying him a bonus if he comes within the allotment, but no bonus if he runs over it?" Henry Wright, general manager of the Metal Products Company, was talking to William Holland, the company's consulting industrial engineer.

"Not much, Mr. Wright. The foreman has too many things to do now that get him into trouble through no fault of his own. Why load him down with financial responsibility? Besides, he isn't built for it."

"But he has the responsibility indirectly now, Mr. Holland. We expect him to hire good workmen and to keep them employed productively. He must use his equipment efficiently. If he has a high amount of spoiled work he hears about it. We hold him within a certain burden ratio."

"That's all true, but in these matters he has authority merely over the details of execution. You hold the control responsibility and, frankly, I think it is your job. Why surrender it to the foreman?"

"I don't intend to do so. I'll set the figures within which each department should stay."

"Then your plan is a camouflage, and no different from your present methods. If the foreman is given the responsibility he must have the authority, and you'll have to let him in on the setting of allotments. If you do, things may go fine while business is good, but as soon as a tight period comes and you want to cut allotments, your trouble will begin."

"But the foreman knows that the total allotment for labor and materials must be reduced during slack times, Mr. Holland. Why wouldn't he understand that other expenses must be cut, also?"

"Because he can't always see the reason and you can't always tell him. An office is not often called upon to cut expenses drastically during temporarily dull periods; it holds on to its staff and carries on its activities about as usual. If a foreman is given greater authority he will want to run the shop on a similar basis. How will that cut costs?

"Your ideas don't coincide with what I've been reading on this subject, Mr. Holland. I believe a foreman could still handle all of this work successfully. In burden costs, at least, he has a big opportunity to save the company money if he has the figures to deal with. He can cut his non-productive labor costs, and see that he has good equipment so that breakdown and maintenance costs are reduced."

"Certainly. Give him all the facts and figures, Mr. Wright, but not the full financial responsibility. Regarding your last point, precious little the foreman has to say nowadays about selecting equipment; maintenance certainly should not be his function."

"Well, I see we don't agree, Mr. Holland. Maybe your ideas are sound, but I'm still inclined to try the scheme."

What Do You Think?

The foreman is a "key" man within the plant, but should he have anything to say about finances? Some companies have budgeted departmental expenses and have given their foremen the job of running their departments on a "business basis." Such plans have been applied particularly to items of burden.

But, is the foreman capable of assuming this responsibility? Does he want it? Will it interfere with his job of production? Will it affect the quality of the product? Can costs be cut by this method? Is the possible saving worth the effort? Executives are urged to contribute their views and experiences on this question for publication in the Executive Forum.

Topic Suggested by James R. Cornelius

DISCUSSION

What Should We Teach Apprentices?

The selection of a teacher is equally important with the consideration of the subjects to be taught. In most plants the tendency is to pick out a man who has the most experience at the trade and assign to him the task of teaching apprentices. This policy is wrong.

The writer taught engineering subjects in an evening school for many years and was considered a good teacher. Later on, however, he took a course in vocational teacher training in one of the universities. At the start he was told that he was a good "teller" but a poor teacher.

The fundamental laws of teaching consist not only in knowing the subject but also in an ability to arouse the student's interest and then being able not only to tell but also to teach.

—CHARLES KUGLER,
General Electric Company, Philadelphia, Pa.

Hiring Back Old Men First

In times of depression industrial misfits can be removed from the payroll. When business increases, however, and the force has to be enlarged, it is always the best policy to hire back competent former employees first.

If entirely new men are hired, they must be made familiar with the shop, tools, methods, and products. They must be put through a course of training before they become efficient. Former employees, returning to the job, know what is required of them and need no training. Their production will rapidly mount to normal, and therefore production costs will be held down. Since they are familiar with the equipment, fewer tools and machines will be damaged. Moreover, they will usually spoil less work, and will preserve better the high standard of quality of the product.

—L. O. BROWN, *Toolroom Foreman, Holcomb & Hoke Manufacturing Company.*

A Novel Reward for Shop Improvements

In a factory employing approximately 4,000 workers the following method of reward was introduced. First, a credit system was adopted by means of which, when a man made a suggestion that was accepted, he would receive an envelope containing a letter describing the extent to which his suggestion could be used, and inclosing a coupon for each credit. When a man received ten credits he could take them to the cashier's office and cash them for full value.

Suggestion boxes were installed in each department, and beside each was hung a chart on which the names of employees whose suggestions had been accepted were recorded. A red star beside a man's name showed that he had one credit, a blue star ten credits, and a gold star one hundred credits. Credits were apportioned as follows: (1) For all plant improvements, such as ventilation, heating, lighting, etc., from one to fifty credits, (2) for all clerical short-cuts, such as improved forms, office procedure, and similar methods, a flat rate of from one to one hundred credits, or 25 per cent of the savings over a period of six months, (3) for all ideas to increase production, credits based on 20 per cent of the savings over a period of one year. The employee received his credit coupons at the end of each month, after the costs had been checked and compared with the previous standard costs.

An employee receiving one thousand credits or more was considered in line for promotion, and many were advanced to higher positions under this plan. At the end of each year the department showing the most credits was tendered a banquet to which were invited men from other departments whose suggestions had been accepted. The winning department received a banner which it displayed for the period of a year. The above plan proved exceptionally effective. Over a period of six years costs have been considerably reduced.—F. A. SCHMIDT, *Industrial Engineer, Western Electric Company, Kearny Works.*

Does a Highly Developed System Pay?

A highly developed system, properly devised, will always pay, provided its installation is not looked upon as the alpha and omega of management, nor a substitute for it.

One feasible solution for the avoidance of tie-ups, such as those illustrated in the presentation of the case, is to utilize a status man, particularly on urgent jobs. While such a man is generally without direct authority, it is his duty to follow up the job intimately in the course of its progress through the organization, and to report immediately any tie-ups or threatened delays to the schedule superintendent or other executive, so that steps may be taken at once to eliminate the hold up, or to provide a more immediate solution to the difficulty. He should visit the various parts of the job in the shop several times a day, or at least daily. Where a delay is unavoidable, steps can then be taken to revise the schedule, introduce overtime, or reroute the job.

A modification of the above system may be based on the use of the project engineer who, with similar duties in part, and a great deal more direct authority, may likewise follow up the progress of the job. In such cases, he can often eliminate interferences directly. Where they are beyond his direct scope and authority, he has sufficient prestige to demand immediate action.

—CHARLES KLYNE, *Foreman, Russell Machine Company.*

Higher wages mean greater purchasing power only when they are accompanied by lower costs in production or in marketing. That is why high wages in trades where production does not increase, add to the cost of living of those in other lines.

A Wage Bonus System That Failed

Discussion

By C. A. CLARKE
Surrey, England

THE REMARKS by P. H. Bryant, in an article under the title given above, on page 21, Vol. 71, of the *American Machinist*, make rather interesting reading. In the opening paragraph the following illuminating sentence appears: "In this particular case some outstanding defects have come to light which no executive has fully recognized, or, having recognized, has succeeded in ironing out."

On reading further one cannot help but think that the failure of the particular bonus system referred to was partly, if not solely, because ". . . no executive has fully recognized, or, having recognized, has succeeded in ironing out." In other words, this case appears to be another instance in which the failure of scientific-management methods, while apparently resulting from the apathy or the canny attitude of the workmen, can really be traced to faulty management.

One gathers from a perusal of the article in question that the management had installed a bonus scheme without having first considered the organization necessary for dealing with bonus estimates. Further, one sees that those executives immediately in charge of the department concerned were not entirely in sympathy with the workmen, or for that matter with the system. It appears almost as though they relied upon the bonus scheme entirely to produce the necessary results and brought to bear none of the leadership and encouragement that a management expects of its officials. These executives were apparently so little versed in the laws of psychology, and understood so little their application, that they were unable to organize the individual temperaments of the workmen under their control to a common end. Since no two human beings are characteristically alike, the control of men, which determines the successful or the mediocre foreman, depends upon the ability of the foreman to interlock "unlike" into the pattern of the efficient department.

In his article, Mr. Bryant mentions the fact that this particular bonus scheme was based on taking longer than the 100-hour basis in which to do the work. In other words, the workman was not penalized for being under 75 per cent efficient. This is, of course, as it should be, for it would be unsafe to apply such a qualification to any man whose report rested upon a bonus scheme. Then again, efficiency is relative only. At the same time, if from observation a man may be classed as inefficient, it is obviously undesirable to employ too many in this class. It is equally obvious that such undesirables should have their activities directed to other channels. There is a penalty for being less efficient than the average.

The fact that the officials in this particular concern did not exercise their discretionary powers—as witness the fact that they retained these virtual inefficients, and by so doing doomed the bonus scheme to failure—showed a lack of sympathy with the whole scheme. Apparently they were of the opinion that the inception of the system, and possibly the methods of computing the bonus, were inaccurate. It would appear as if they were of the opinion that the inefficient were shown to be inefficient only by the records of the bonus office. If this were not the case, why were the inefficient men retained only to ruin ultimately a management order?

It seems to be Mr. Bryant's opinion that the decline of average efficiency was the result of that temporary expedient of part day work and part bonus. While this perhaps indicates poor organization, it is doubtful whether it is responsible for what occurred. A little further on Mr. Bryant states as a second influence the fact that some of the workmen did not respond temperamentally to the bonus stimulus. The inference here is that these individuals were disinclined to work any faster, even for the purpose of obtaining extra pay, and that it is safe to say that they were quite average day workers. Furthermore, seeing that the bonus did not interest them, they were unlikely to slow down because such a scheme was extant.

We have here two conditions: A workshop with an incomplete bonus scheme, and a group of workmen, some of whom responded to the scheme and supposedly increased their speed, and a number of whom felt no stimulus at all, being content to offer a fair day's work for a fair day's pay. Why should the fact that there was an incomplete bonus arrangement cause the collapse of the scheme and destroy the morale of the shop when there were workmen available who were willing to produce the necessary labor without any financial incentive? Surely the officials concerned omitted to apply one of the first laws of psychology—like unto like. It would seem that those jobs that were not priced should have been allocated to the men who were not on a bonus. If, under this arrangement, the required amount of work was not produced, then disciplinary measures were indicated. Perhaps it would not be out of place to mention at this point that most men, whether on bonus or otherwise seldom fail to respond to encouragement from their superiors. On the face of it, and from the facts given, encouragement played very little part in the scheme.

Another point that one feels sorry to see Mr. Bryant having to record is the cutting of rates, should the workmen appear to be making too much money. Such a course is short-sighted policy, all too prevalent, unfortunately, and will destroy all good feeling. Having destroyed good feeling, it promotes a policy of deceit and subterfuge among the men.

Regarding the accusation that a bonus system produces poor workmanship, it is fairly safe to say that such a theory is more academic than real, for it follows that if a rigid system of inspection is in force, and if supervision is adequate and efficient, poorer work will not be produced than is produced on a day work basis. Inversely, if supervision and inspection are lax, opportunity for slipshod methods will be present and will be availed of in many cases, whether day work or bonus is the system of payment.

Care and Cleanliness

Real Assets in Polishing

By FRED H. COLVIN
Editor, American Machinist

Attention to details and cleanliness pay a substantial dividend. The polishing room is no exception to this rule

Fig. 1 — Corner of maintenance room where the wheels are cleaned of old abrasive, and coated with new, in a systematic manner

Fig. 2—Coating polishing straps with abrasive after they have been coated with glue. Straps and wheels are stored here until needed

KEEPING polishing wheels and belts in good condition is an essential part of securing good results in the polishing room, both as to quality of the work and the cost. Cleanliness is one of the most important requirements. This is in marked contrast with the average practice of a relatively few years ago when the polishing room was about as uninviting a place to work as can be imagined. Not only should the polishing room itself be kept clean, but the room where the polishing wheels and belts are coated with abrasive should be kept equally clean and orderly.

Experience shows that attention given to the glue used on belts and wheels pays for itself in reduced costs of polishing. It must be of the best quality, it must be freshly made up and not overheated. It must never be used after it has been allowed to cool, as it loses its toughness. It must be remembered that the individual grains of abrasive are subjected to severe shocks when the work is pressed against the rapidly moving strap or wheel, and unless the glue is tough, and can hold the abrasive against this strain, the grains are broken out and the cutting life of the belt or wheel is shortened. For this reason the electrically heated glue pot, with its controlled heat, has been

adopted by the William Schollhorn Company, New Haven, Conn., from which these illustrations were secured. By uniform heating, and making up fresh batches of glue twice a day, the problem of securing a satisfactory bonding for the abrasive seems to have been solved.

A section of the wheel maintenance room is shown in Fig. 1. Four small glue pots are grouped in the metal covered table, being sunk into the table for convenience. An arrangement, not shown, makes it easy to support either the belt or wheel while applying the glue to it. At the left is the soaking tank where the old glue and the remaining abrasive are removed from used wheels. The

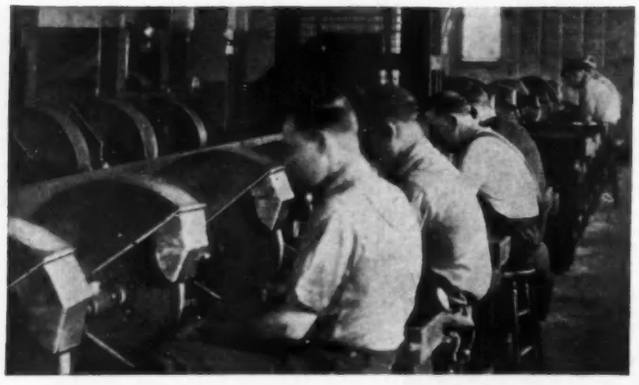


Fig. 3—Polishing room where the proper arrangement of wheel guards and exhaust fans keeps the room free from dust

wheels are revolved slowly on two rollers, the outer one being driven by the belt shown. Immersion in the water softens the glue. After they are cleaned and dried they are ready to receive a new coat of glue and abrasive. This company never applies a new coat over an old one.

Abrasive is applied by the usual method of rolling the freshly glued wheel in a long, narrow box that contains the grinding material. These boxes are kept covered, except when in use, as seen in Fig. 2 where a polishing belt is being given a coating of abrasive. The wheel is used inside the belt, and the abrasive can be applied to the belt as easily as though it were a wheel. The method of storing straps and wheels can also be seen in Fig. 2. Care in storing and handling should not be overlooked, as it directly affects their useful life.

Experiments have been made to test the value of heating the abrasive before applying it to the wheel. It is believed that the results are slightly better, but that it is not enough of an improvement to warrant the cost of heating.

That cleanliness in polishing and buffing should extend to all departments is borne out in the Schollhorn plant. Both Figs. 1 and 2 showed the maintenance room. In Fig. 3 is shown the polishing room under working conditions, except that the wheels have been stopped momentarily to be photographed. The wheels are carefully guarded and an ample exhaust system takes care of the dust. The stands are so made that the wheels can be easily removed and replaced when necessary, and the work stands are located at a convenient height to minimize fatigue.

Flash point is not an indication of the value of an oil for any particular purpose. The flash point is of importance mainly in connection with fire hazards.

SEEN · AND · HEARD

By JOHN R. GODFREY

Hydraulic Feed—Power Feed Selection—Chip Breakers—Standard Paint

OUTSTANDING features of the machine tool exhibition in Cleveland were the many hydraulic feed mechanisms. The old troubles with air pockets seem to have disappeared. In one machine at least, several rather delicate feeds were so synchronized and interlocked as to give automatic control like that usually secured by cams and levers. Nor is the use of the hydraulic feed confined to any one class of machines. Grinders, lathes, milling machines, broaches, shapers, and honing machines, all use it to some extent. As with most devices of the kind, its origin is old. It was seen on both lathe and grinder years ago, but long experience has perfected it to the present point.

* * * *

IT IS a far cry from the days of narrow belt feeds, limited in number, to the sixteen-gear feeds, or more, found on many machines; from change gears that required calculation to handles and index plates. In one machine, at least, all the speeds and feeds are secured by power. The operator touches a lever, the feed or speed dial spins around to the desired number, and the machine is ready for work.

* * * *

I RECENTLY heard of a shop which abandoned the use of the new alloy steel tools because of the difficulty of disposing of the chips. From the material being turned, the chips came off in long continuous rolls that were difficult to dispose of. One lathe builder at the show demonstrated a tool with a tungsten-carbide cutting edge and a piece of high speed steel brazed on the shank behind it to break up the chip as it rolled off. The hump of the chip breaker was high enough to change the natural curl of the chip and to break the chip into pieces that resembled elbow macaroni. The chip problem disappears. There is an answer to nearly every problem if we tackle it in the right way.

* * * *

UNIFORM painting of machine tools in the new machine tool gray is pleasing. It enhanced the impression that the machine tool exhibition was one big shop equipped with the very latest machine tools. While the rather dark gray does not reflect as much light as some of the lighter shades, it is both dignified and substantial. In the average shop, where cleaning does not always receive the attention it should, this dark gray will probably present a better appearance than some of the lighter grays, and will not show up to such an extent the stains from oil drip.

Milling Fixture Designs That Save Time

By Frank W. Curtis

Design of the fixtures used for repetitive milling operation is becoming increasingly complex, but the author shows how time spent on design will cut production costs

TOOL engineers sometimes limit the construction of a jig or fixture to a simplified form, and overlook design features that would increase the output considerably. A simple tool has its merits, but is not always the most efficient. On the other hand, just as a simple design has its drawbacks, so a complicated one has its advantages. If an instrument of elaborate design will save a fraction of a minute or more on each part, where the production is continuous, that tool has a definite place in the shop, and the additional cost involved in its construction will soon be repaid in output results. Modern manufacturing methods demand operations that are rapid, yet accurate, and the tool designing department must satisfy this demand.

Several unusual fixtures, designed by the engineers of the Kearny & Trecker Corporation, Milwaukee, Wis., are described in this article. A fixture for milling an angular face and a flat surface on the head end of a connecting-rod bolt is illustrated in Fig. 1. The fixture differs from the average form of rotary design inasmuch as the work is clamped and ejected automatically. Construction details of the fixture are illustrated in Fig. 7.

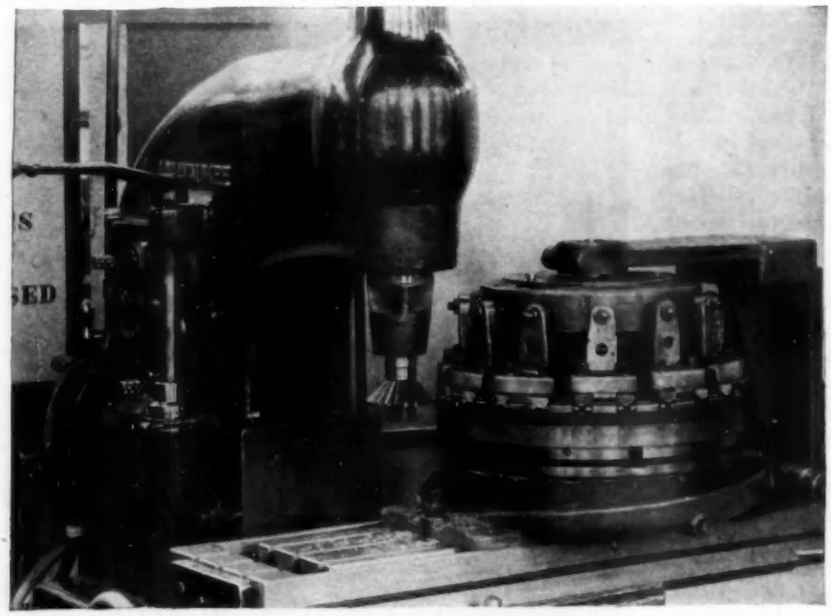


Fig. 1—A rotary-type milling fixture arranged to hold 48 pieces. It has an automatic clamping device and an ejecting mechanism, so that the operator has only to load the work

Loading is done at the front of the machine, four pieces being placed in each clamping section. The clamps, as shown at *A*, are hinged and have two self-aligning wedge-shaped blocks that press the body of the bolts against V-block supports. The body of the fixture, carrying the work, revolves on a stationary center plug. Mounted on the plug is the hardened cam *B*, against which the clamping plungers bear. As the base revolves, the plungers rise and fall, engaging the heel of the clamps and causing an automatic clamping action. Provision for elasticity in the clamping mechanism is provided by stiff helical springs *C* which are inserted in the clamping plungers as shown. A plan view of the automatic ejecting mechanism is shown below the elevation, and a front view of the holding mechanism is shown at the left. The spring plunger *D* rides on the inner face of the saw-tooth cam plate *E* so that it kicks outward when released, striking the ejector pin *G* which has a contact face wide enough to eject two pieces at once. The arrangement of the mechanism is such that the work is ejected at the rear of the machine after the clamping pressure has been released. The machining is done in a vertical-type machine, equipped with an 18-in. rotary table. There are 12 sections, arranged to hold 48 pieces.

A milling fixture for roughing the contour of articulated rods for radial airplane-engines is illustrated in Fig. 3. The rods are clamped in a hinged section of the fixture, which is equipped with two hardened cams that ride over a roller. The contour of the cam is reproduced in the work. Two pieces are held at a time, and the milling is done first on one side and then on the other. The fixture eliminates the use of form cutters and has

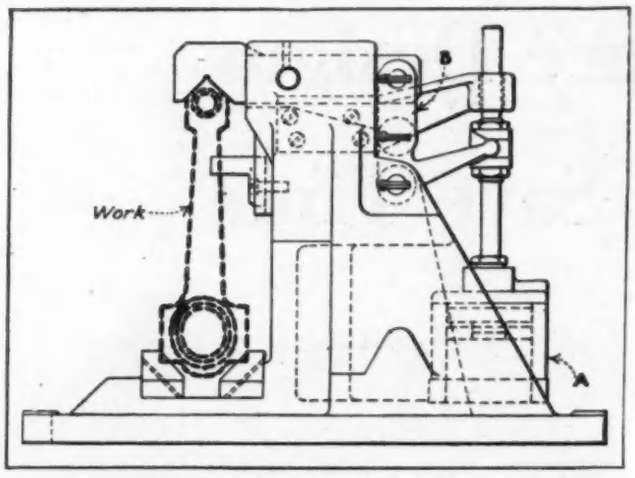


Fig. 2—The air cylinder used for clamping is made integral with the fixture base. The plunger operates the ball crank

surpassed the production of a former method in which only one rod was milled at a time.

The construction of the fixture has some novel features. An outline of the design is shown in Fig. 4. The

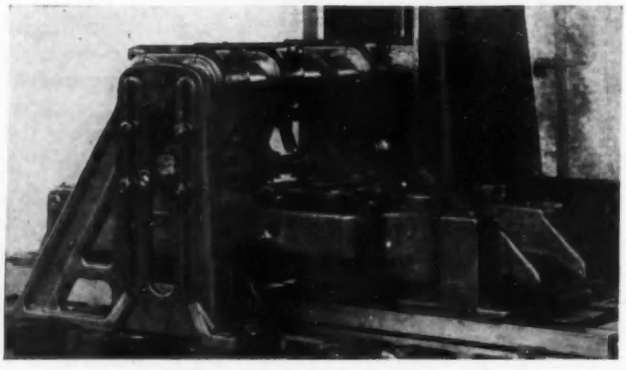


Fig. 3—A contour milling fixture arranged so that the movement of the work is done by the fixture, thus eliminating the necessity of form cutters

fixture body is hinged on the pin *A*, which is mounted on a bracket attached to the machine table. The other end of the fixture is supported by a U-shaped bracket that permits a limited vertical movement. Two helical springs hold this end of the fixture downward, so that the contour cam plate *B* will bear firmly against the roller *C*. Another feature of the fixture is the integral trough built around it, so that the cutting lubricant will not splash on the operator.

An unusual form of rotary milling operation is illustrated in Fig. 5. It is used for machining the periphery of double-link brake shoes and employs a shell-type end mill. The fixture holds two pieces, one of which is in the machining position while the other is at the loading station. The work is located on hardened blocks and held against two stop pins by heavy clamps.

One advantage of the operation is that the fixture is mounted on a 22-in. rotary table of the jump-cut type. There are two separate rotating speeds, one for cutting and the other for rapid movement between cuts, so that lost time is reduced to a minimum. The feeds are obtained from two shafts driven from the feed box of the machine. These feed shafts operate at different speeds and either one can be engaged to drive the rotary table by means of a clutch arranged to work automatically by means of dogs located on the periphery of the table. In all, there are four dogs attached to the table. Assuming that the cut is started on one of the brake shoes, the machining feed is engaged until the cut has been completed. At this position one of the dogs trips the clutch lever simultaneously disengaging the cutting feed and engaging the rapid feed, until the next piece of work reaches the start of the cutting position. At this location another dog strikes the clutch lever and again causes the cutting feed to engage. The dogs, of course, can be moved around the entire surface of the table in order to accommodate various lengths of work. In fact, as many dogs as are necessary can be mounted on the table, and

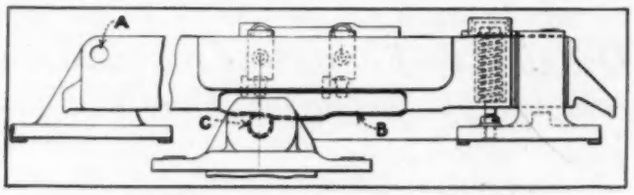


Fig. 4—Forming is done by having the fixture body mounted on a pin, so that it is free to move vertically in relation to the contour cam and roller

any desired cycle can be obtained for the various types of rotary milling work.

Pneumatically operated fixtures find an important place in milling fixture practice, since a rapid clamping action shortens the loading time and increases the output. An example of such a fixture is illustrated in Fig. 6. This fixture is used for milling the four bearing faces of a connecting rod simultaneously. The work is done in a duplex-type milling machine equipped with two-spindle heads. The illustration shows only one fixture in place but a duplicate of the fixture shown is located at the other end.

In Fig. 2 are shown the constructional features of the fixture. It has an air cylinder built integrally with the base, as shown at *A*. Vertical movement of the plunger

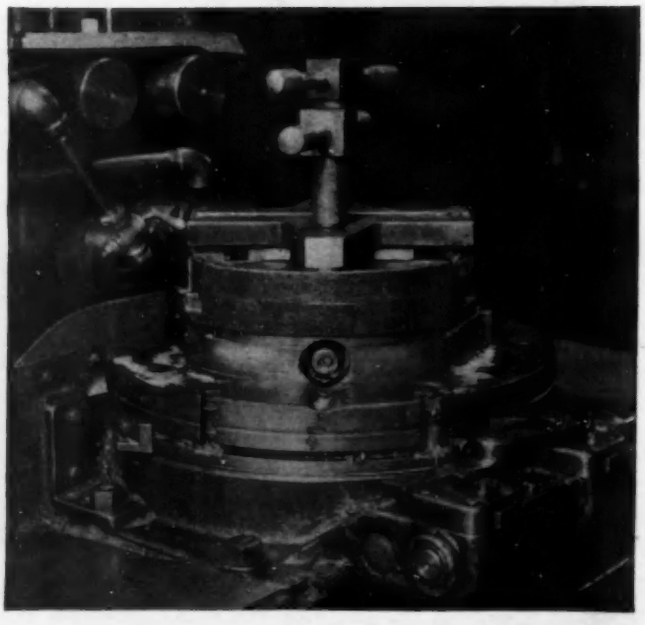


Fig. 5—A rotary milling fixture set up on a jump-cut table that permits two rates of speed, one for machining, and the other for quick travel

is transferred to the toggle arm *B*, which in turn operates the clamp. The large end of the work is located in a stationary V-block, and another V-block is machined in the clamp to hold the smaller end. The fixture can be arranged to suit different sizes of connecting rods by changing the lower V-block and applying a clamp.

Still another fixture, illustrating how unusual movements may be incorporated, is illustrated in Fig. 8. It is designed for form milling contours on connection rod caps. A fixture of the hand operated type could be used for this operation, but the smooth finish required would necessitate extreme care on the part of the operator, if it were left to his judgment to feed the work. For this reason, the work is driven by a gear box made integral with the fixture.

A fixture of this type may look complicated at first, but when the saving in manual operation is considered, it will be seen that the additional mechanism is justified. The set-up may be considered an ideal operation in that it is safe and efficient. The only duties of the operator are to load the piece, start the cut, and either wait for it to finish or do something else while the cut is in process. In this particular case the operator also runs an additional machine. The automatic stop feature eliminates the danger that the work might feed too far.

The examples of multiple fixture described above are a few of the possibilities of increasing the output and extending the usefulness of the milling machine.

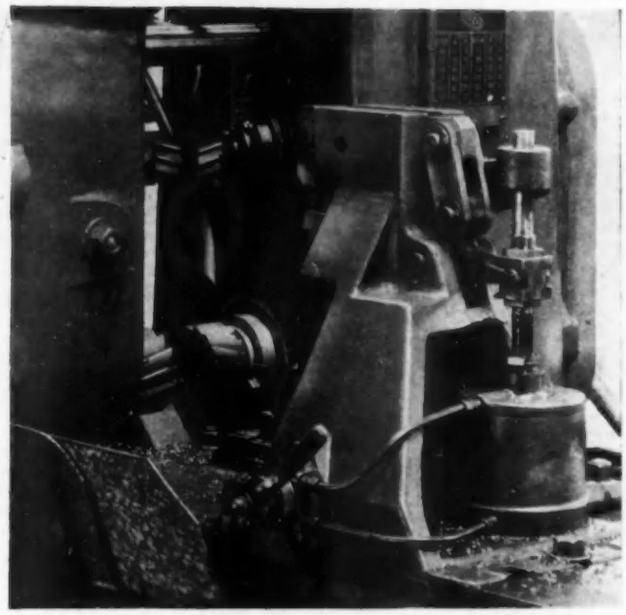


Fig. 6—A reciprocating form of milling operation that utilizes two air operated fixtures mounted in a four-spindle milling machine of the opposed type. All faces are completed simultaneously by end mills

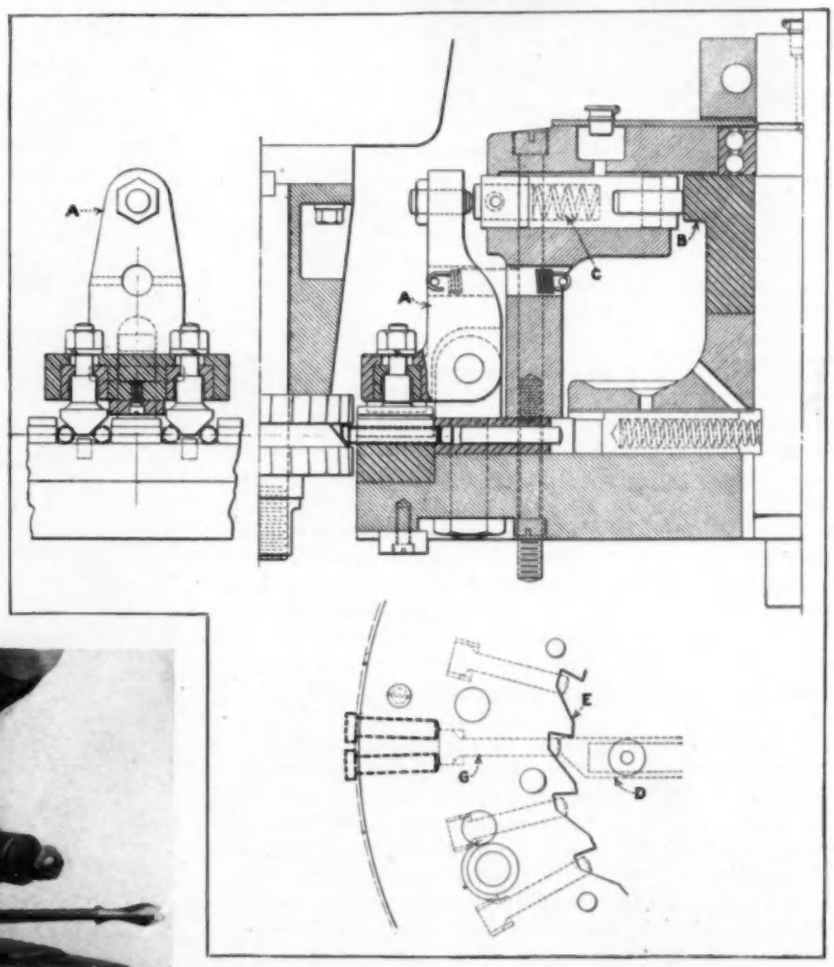
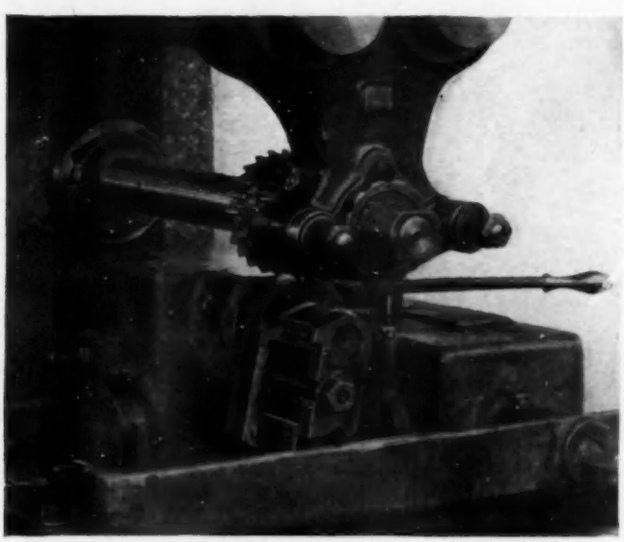


Fig. 7—Constructional features of the rotary fixture showing how the clamping mechanism is arranged to hold four pieces with each clamp unit

Fig. 8—A form milling operation in which the work is revolved automatically by special gearing built integral with the fixture



Photographs and drawings by courtesy of Kearny & Trecker Corporation, Milwaukee, Wis.

MODERNIZING The Factory Handling System

By GEORGE E. HAGEMANN

Associate Editor, American Machinist, Chairman, Materials Handling Division, American Society of Mechanical Engineers

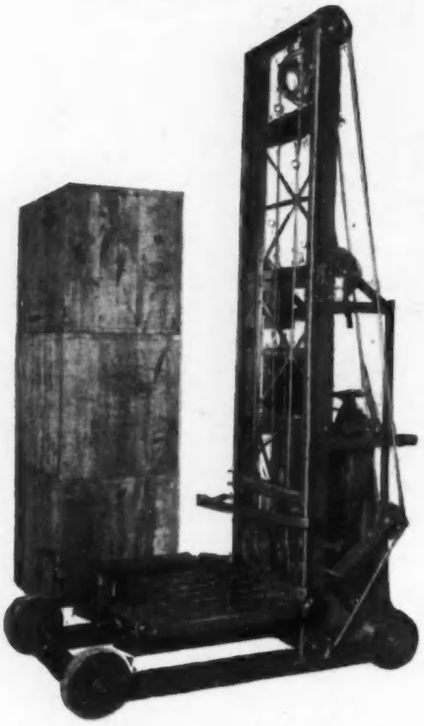


Fig. 1—The Lewis-Shepard Jacklift forms an efficient handling unit where heavy objects must be stacked, or elevated to shelving

Improvements in methods and equipment offer definite and large savings to every manufacturing plant in the metal-working field

IN THE modern manufacturing plant the handling of materials ranks as one of the most important functions of factory operation. The trend of the times is definitely toward ever higher production. The development of tungsten-carbide cutting tools in the metal-working industry, and of all sorts of automatic equipment in practically every line of manufacturing, provides for high-speed work. Since low inventories are demanded, railroads, motor trucks, and other transportation media become the moving storerooms for incoming raw materials and outgoing products. Since production must be kept on the move within the plant, material handling equipment must maintain a smooth, unbroken flow of work.

No plant, large or small, can afford to overlook the advantages accruing from performing its handling operations mechanically. Even the factory that has been built for years, and hence does not possess the facilities of the latest industrial structures, can profit to a marked degree by attacking and solving its handling problems.

In a highly competitive field the methods employed for handling materials may often form the line of demarcation between profit and loss. This statement may sound extravagant. But, as an instance of the savings that can be accomplished, the case of one of the branch plants of an internationally-known American concern noted for its pioneer work in mechanizing handling operations offers itself for consideration. This plant, by a simple re-layout

Fig. 2—Loose castings are unloaded from box cars and bagged by this 1,000-lb. Baker crane truck with magnet. The unit does the work of sixteen men

Paper presented before the Production Session of the Fourteenth Annual Convention of the Associated Industries of Massachusetts, held in Boston, October 24, 1929.

of processes to permit of the installation of certain additional handling equipment, has saved $275,000 during the past four months, or at the rate of $825,000 per year. If refinements in a plant already noted for amazing efficiency can bring about such savings, or approximately one per cent of the retail selling value of its particular output, what can be accomplished in plants where handling has hitherto been almost neglected?

The present article is concerned chiefly with the analysis and application of material handling equipment to medium-sized or smaller plants already constructed, many of which comprise older buildings that cannot easily be altered. The analysis will cover the factors to be considered in modernizing the factory handling methods to secure the greatest economic return at the least cost consistent with the desired results.

Perhaps the easiest way to crystallize thought on the problems involved is to supply a check list of the points to be covered in any material handling survey made to modernize a plant. Such a check list follows. It has been developed in an attempt to furnish a comprehensive summary of points to be covered. This check list should serve for any type of handling installation in any plant engaged in almost any line of manufacture. The points that do not fit any particular case can be dismissed from consideration. Likewise, if the list seems too elaborate for a rather simple handling problem, the points that appear to be of minor importance can be neglected.

The check list is divided into four sections: Factors of the product or products to be handled; factors of the processing, or manufacturing methods and equipment utilized; factors of the handling methods and equipment employed; factors of the economy that it may be possible to obtain by a change in plant layout and handling methods. After all, economy dictates most material handling improvements, either that voluntary economy which may be classed as a manufacturing virtue, or that involuntary type forced on by bitter necessity and competitive pressure.

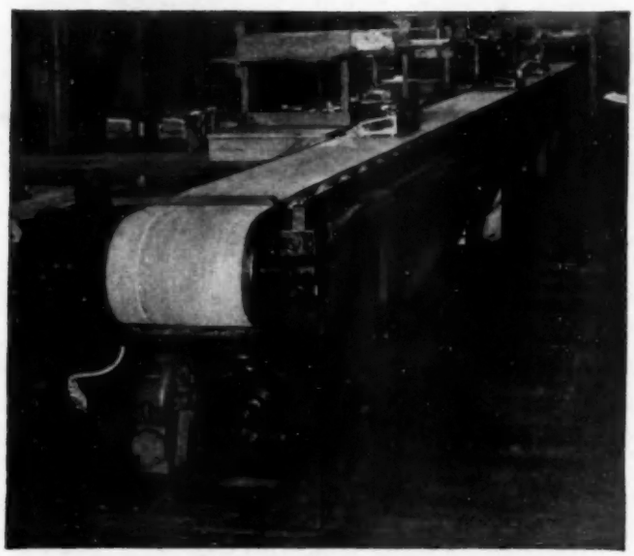


Fig. 3—For the assembly of King radios this Mathews belt conveyor acts both as a pace-setter and handling unit

Factors of the Product

1. Is the product in bulk, in units, or in assemblies?
2. Is it heavy or light?
3. Is it large or small?
4. Is it clean or dirty?
5. Is it harmless, poisonous, or explosive?
6. Is it awkward or convenient to handle?
7. Is it fragile or strong?
8. Of what materials does it consist?
9. Is it valuable or cheap?
10. Must it be kept sanitary?
11. Does it require special conditions, such as controlled temperature or humidity?
12. Is it dry, pasty or liquid?
13. Is it hot or cold?
14. Is it perishable or permanent?

Fig. 4—Two 1,000-ft. Link-Belt conveyors in this plant handle sheet-metal stoves through assembling, enameling, drying, crating and shipping

Factors of Processing

1. Is the product to be handled standard, special, or a temporary line?
2. What volume of output is handled? Is it steady or variable?
3. Is the volume likely to increase or decrease, and by how much?
4. Are the manufacturing operations standardized and stabilized, or likely to change?
5. Is the manufacturing equipment standard or special, and is it likely to be changed?
6. Is the equipment layout the most suitable for the manufacturing purpose? If not, can it be readily changed? Will a new layout simplify handling or eliminate any handling operations?
7. Are feed-in and outlet departments conveniently located?
8. Must cushion stocks be carried prior to, during, or after manufacturing operations? What quantities are involved?
9. Are manufacturing operations interspersed with treatments of the product such as heat-treating, pickling, cleaning or washing, baking, seasoning, etc.?
10. Are preliminary unpacking operations or succeeding packing operations necessary, and do they, or can they, form part of the cycle?
11. Is it possible to perform operations on the move?

Fig. 5—Cleveland Tramrail single-leg gantry cranes are used at the Warner and Swasey plant for local service to supplement the work of overhead traveling cranes. The crane pictured has a 40-ft. span and can be pushed along the runway easily by one man, regardless of the position of the load on the crane beam

carried? If the floors must bear the load are they strong enough?

12. If the use of industrial trucks is contemplated, are the floors smooth and durable? Are there any differences in floor levels? Can they be overcome by ramps?
13. In multi-story buildings are the elevators of ample size and capacity in case industrial trucks must travel between floors? If not, can new elevators be put in, can ramps be built (to second story), or can hatchways be constructed between floors with hoists or cranes to do the handling on the upper floor or floors?
14. For yard handling or inter-building handling will overhead equipment be in the way if installed? Are there suitable

12. Must the products undergo inspection during processing?
13. Are any weighing operations necessary?
14. Is the time of processing long or short?
15. Does the product travel a considerable distance (unnecessary travel not considered) through its cycle of manufacture?
16. Are processes intermittent or continuous?

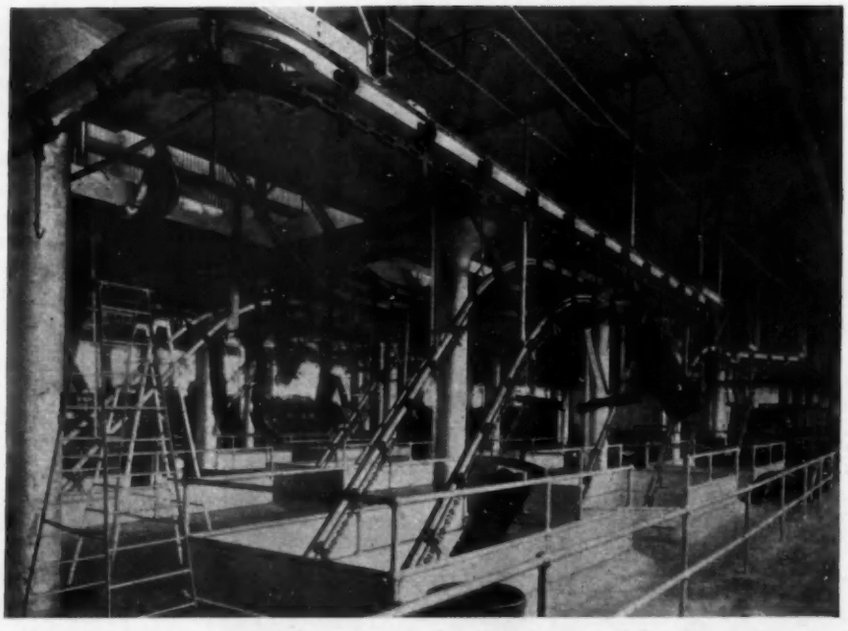


Fig. 6—An extensive handling installation, made in an existing building of one of the automobile assembly plants, goes through floors, out through the roof, and down the side of the building to lower levels. An Anchor Steel system with Chain Belt carriers is employed

Factors of Handling

1. What handling methods are in present use and what equipment do they employ?
2. Do conditions preclude the abandonment of any of these methods?
3. Are there any "bottle-necks" in the handling?
4. What handling methods are most in need of alteration?
5. Can handling operations be tied in with processing at any points, as in spray-painting, heat-treating, etc.?
6. Will one type of handling equipment perform the work, or will two or more types, co-ordinated, be more efficient?
7. What capacity must the equipment have as to load it must support and volume it must carry?
8. Will it require power drive, and what type must it utilize?
9. Should it have variable speed?
10. What types of handling equipment are available for the work?
11. Will the building allow of the installation of the type or types of equipment most suitable? If an overhead system is desirable will the ceiling structure, columns, or walls support the weights to be concrete roadways for industrial trucks? (For at least two types this is unnecessary.)
15. If electric trucks are utilized, is a charging station available?
16. Can the proposed installation be made in part and completed later, or must it all be installed at once?
17. What sequence of installation should be followed?

Factors of Economy

1. What labor is required under present and under proposed handling methods? How many men? What are their rates? What is the total cost of labor?

2. What power is required—present and proposed? Will any investment in power facilities be required (charging station for truck batteries, etc.)? What are the relative costs for power?
3. What investment is involved (unamortized investment in present equipment and initial investment in proposed equipment, including installation charges in each case)? What relative interest charges must be borne?
4. What depreciation and obsolescence charges are involved in the present and in the proposed equipment?
5. What maintenance and repair charges must be met with the existing and the proposed equipment?
6. What relative supervisory expense or labor burden is involved?
7. What additional output can be handled by the proposed installation and what financial value can be placed upon this factor?
8. What annual saving will accrue from the installation of the new equipment? (The materials handling formulas developed by the American Society of Mechanical Engineers are suitable for calculations of economies.)
9. In how long a time will it pay for itself out of earnings? (See A.S.M.E. formula.)
10. What saving in processing time will it bring about?
11. What percentage of time will the equipment be in use under present volume of output?
12. What will it cost to relocate equipment where necessary under the new scheme?
13. What will it cost to relocate departments under the new scheme?
14. Can the handling equipment be relocated and reutilized if changes in methods must later be made? If not, what will be its scrap value?
15. What investment in auxiliary devices will be required (carriers, platforms, loading or unloading devices, etc.)?

The type of equipment to be selected depends altogether upon the local problem. Almost every plant can

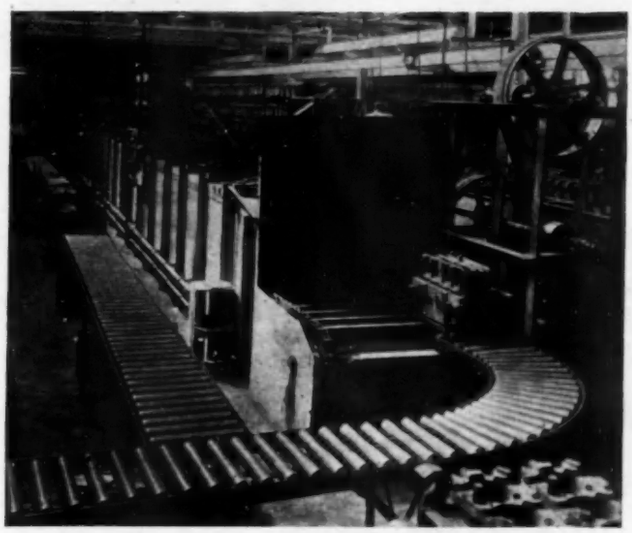


Fig. 7—At the Wilson Foundry, roller conveyors carry flasks through drying ovens

save considerable money by the use of mobile equipment such as hand, electric, or gasoline lift trucks, stackers or portable elevators, tractors and trailers, and even the ordinary hand truck. Such equipment is flexible, fast, of high-duty, and fits admirably into every handling scheme. Good floors of suitable strength, well defined aisles, ramps or elevators to reach upper floors, and, perhaps, a battery-charging station, are the only facilities required. Where considerable material is to be moved much more than 100 ft., the power truck should probably be used. If distances are 50 to 100 ft. the hand lift truck may be more suitable. These figures, however, are arbitrary.

Other types of equipment are fixed to the building structure or are carried on the floors. These comprise monorail conveyors, chain conveyors, belt conveyors, power or gravity roller conveyors, slat or apron conveyors, floor-type chain conveyors, screw conveyors, spi-

Fig. 8—The work of pouring castings is facilitated and reduced in cost by the 1-ton Shepard crane operating in this foundry

rals and chutes. Any or all of these can be worked into the same handling system, or any one type can be used alone. The particular problem determines the type to select. But, unfortunately, many executives and engineers hesitate to employ such installations because they are fixed to the building structure. Wherever considerable quantities of material have to be moved over definite routes, on regular schedules, and particularly where processing operations can be worked into the scheme, some form of fixed conveyor will quickly return its cost.

Another group of handling equipment that fits into a modernization program is composed of cranes, hoists, floor gantrys, chain blocks, and the plant elevator. With the exception of the floor gantry they are all well known. But all too often, while adequate in the beginning, they may become out of date and may need to be replaced by newer equipment of the same type, better able to meet modern demands. Many plants have little 6,000-lb. freight elevators that should be torn out and replaced by those of larger size and capacity to carry lift trucks to upper floors, thus to simplify and reduce the cost of many handling operations. (A final group of internal handling equipment that is amalgamated with processing comprises, heat-treating furnaces, washers, pickling machines, plating equipment, cupola chargers, and like machinery. Such should not be overlooked.)

Any industry, of any size, in any locality can profitably consider methods to improve its handling operations. Even the largest and most up-to-date plants find the subject one requiring constant study. To keep in pace with the times, abreast and ahead of competition, is one of the foundation jobs of management.

Increasing Foundry Output

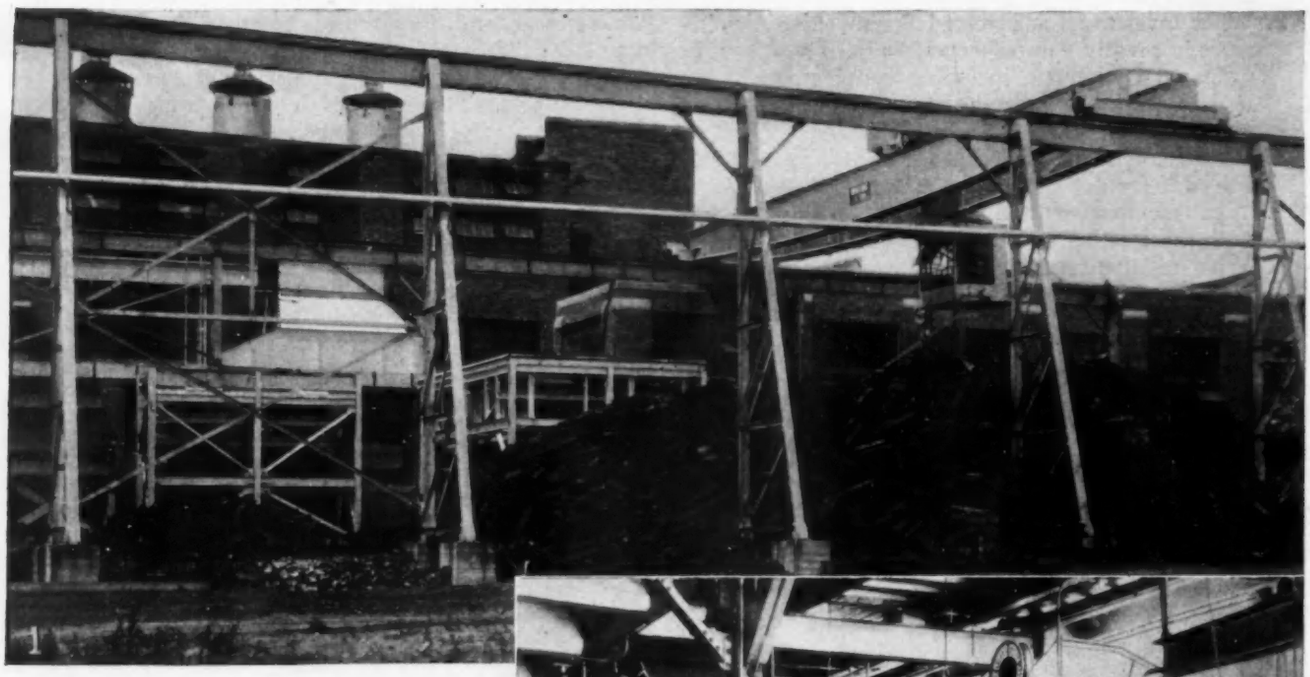


Fig. 1 — General view of the raw material storage. The pile of scrap castings consists of old cylinder blocks

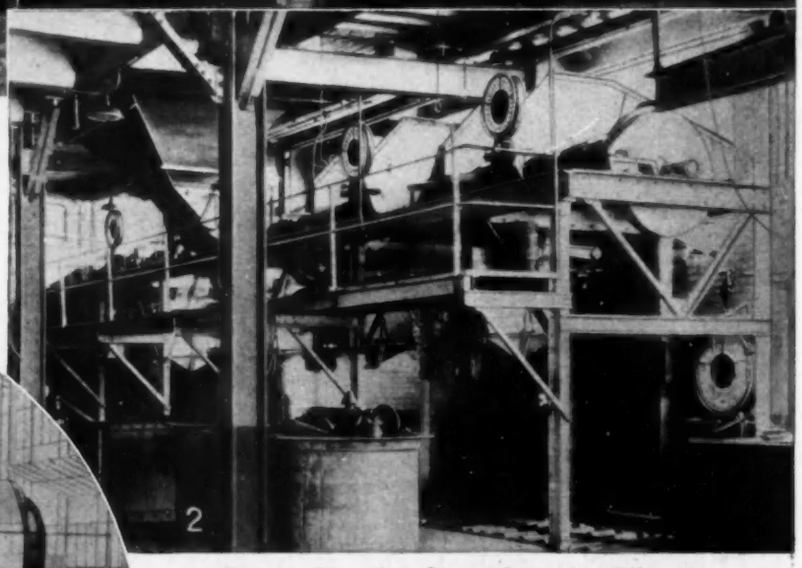


Fig. 2—Charging floor where the different proportions of pig, scrap, coke and flux are weighed and checked

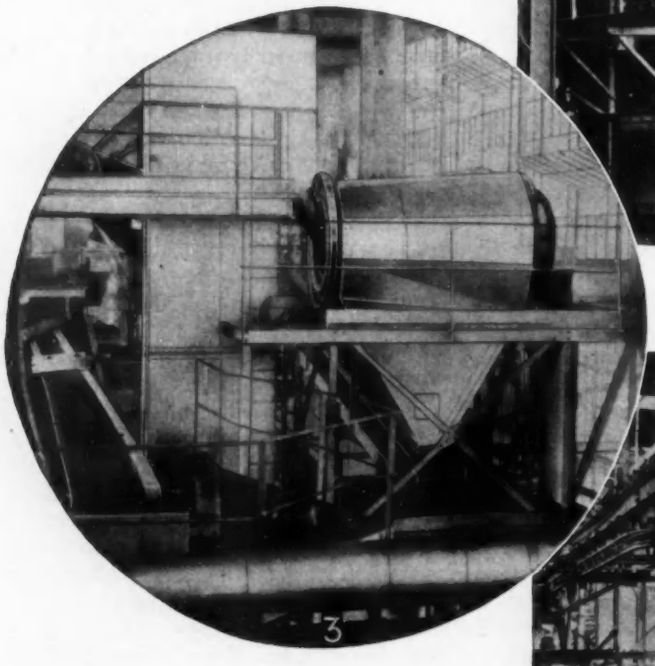


Fig. 3 — The importance of properly mixed and thoroughly tempered sand, is recognized in this foundry layout

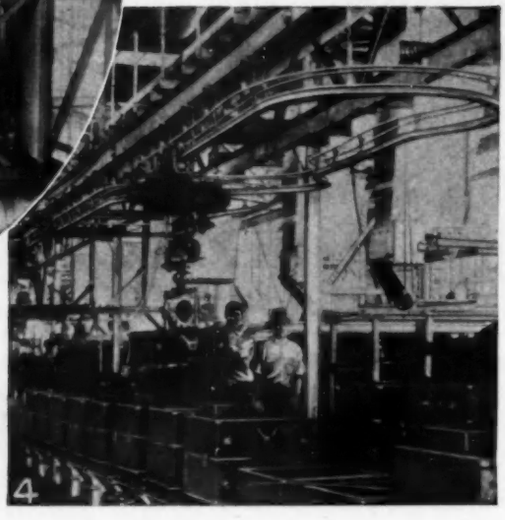


Fig. 4 — Molding is done adjacent to a conveyor. The copes and drags are made at different places, and the mold is closed on the conveyor line

by Mechanization

Photographs by courtesy of
Link-Belt Company, Chicago, Ill.

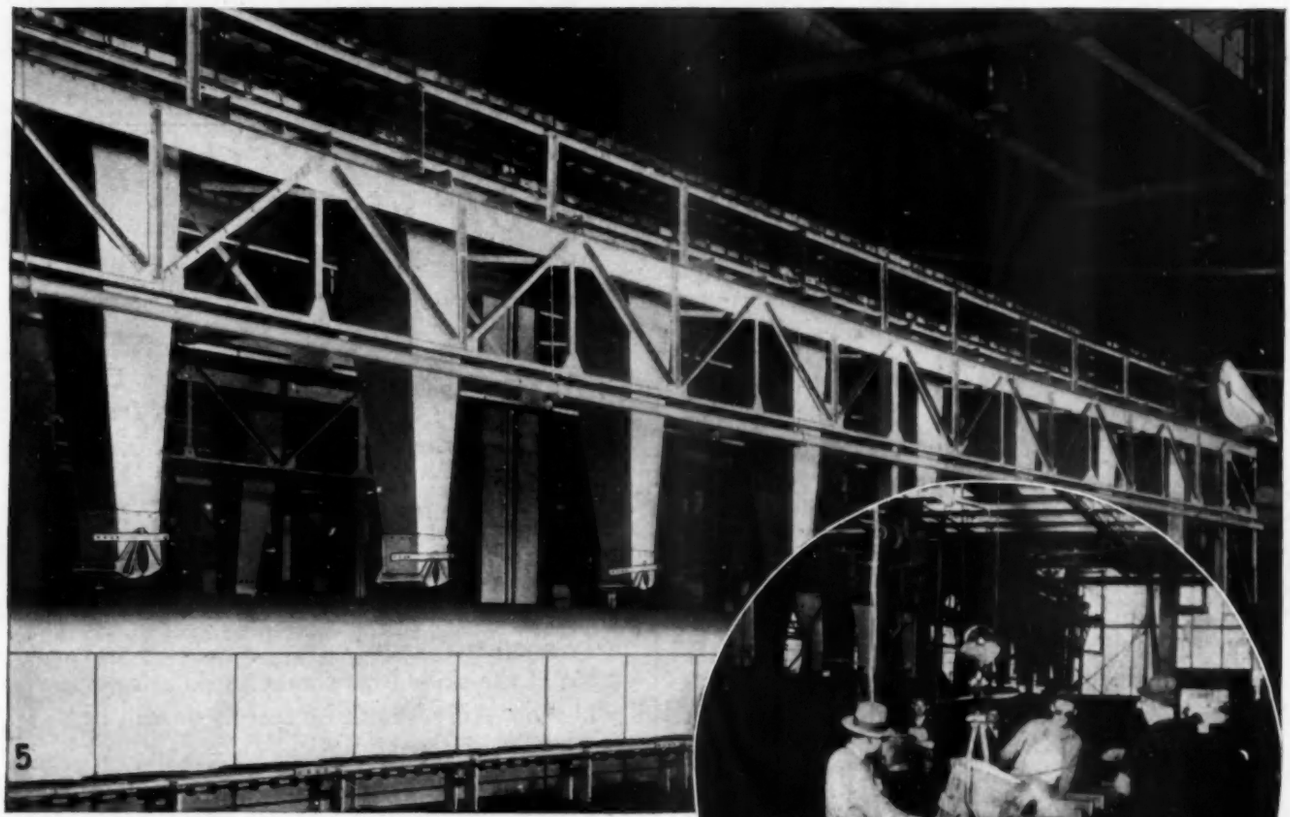


Fig. 5 — For miscellaneous molding a series of hoppers fed by an overhead conveyor, furnishes sand to flasks on a lower conveyor

Fig. 6—Pouring is done while the flask is passing the cupola section. Several gangs "spell" one another in pouring

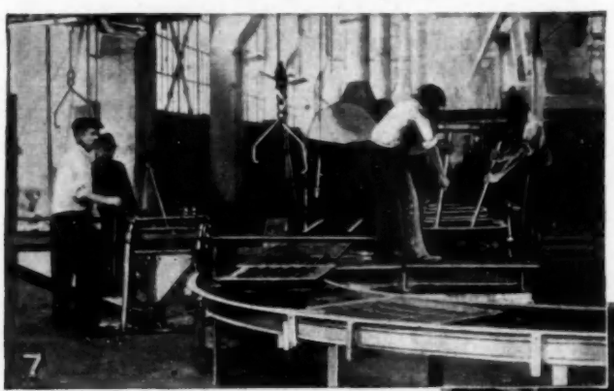


Fig. 7—At a designated point the flasks are removed from the conveyor line. The cylinder blocks are shaken out manually as shown

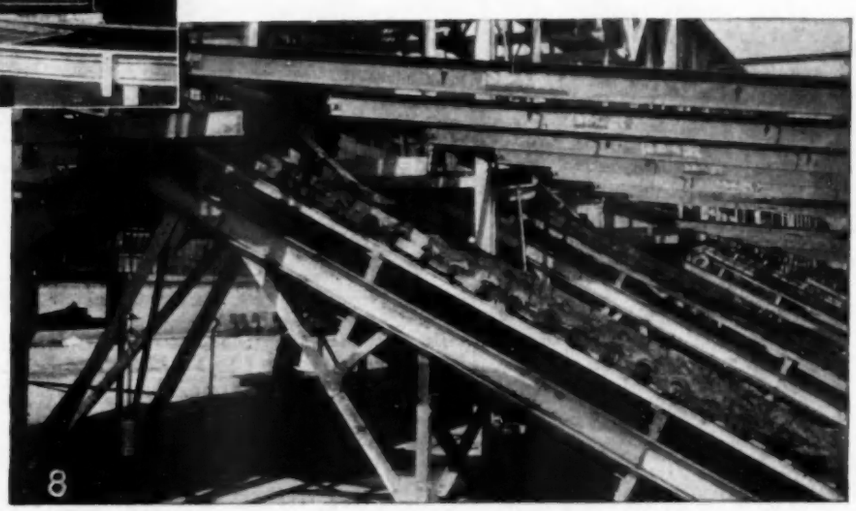


Fig. 8—As a final operation the castings are cooled on their way to storage. Inclined conveyors meet the main one at several places

The following narrative is a "case" presentation of the topic. It has been written to involve some of the questions that arise in the average shop. For guidance in preparing discussion the questions given at the foot of the page have been arranged

Who Shall Be Laid Off First?

"LOOKS like we'd have to lay off a few men, Al," said Ed as they walked to the train one night last week. "Losing that contract on those interlocking devices sort of puts a crimp in the shop."

"Yes, Ed. And I guess it's up to us to weed out a few men, badly as I hate to do it. The question is, who'll we let go?"

"I'm planning to give some of the highest priced men a vacation. They can stand it better than the others, and it will save more on the payroll. Who are you going to lay off?"

"I hate to lay anyone off, but I'm not going to put out the best men. I don't believe it's good policy from any point of view. If we keep the poorer men on and lay off the good men, it is mighty poor incentive for a man to do his best."

"Yes, that may be true in a way, but the good man can get a job easier than the poor man, and he can afford a layoff better."

"That isn't such a good argument, Ed. If the good man gets a job somewhere else he probably forces a lower grade man out of a job in the other shop, and anyway, I don't see why we should penalize a man who has worked his way into a good job."

"But if you lay off the poor men, who will do the low grade work? You can't put a high priced man on a job that a low priced man can do."

"That's just what I'm going to do, Ed. I'm going to keep our best men so as to have a good foundation when we need a full crew. You said yourself that the good men could easily get another job, and then we'd lose them. You can't ask a man to quit another job unless you offer him more money. He'd prefer to stay at the new place rather than make another change."

"Will the skilled man want to do a lower grade job, Al? Won't he feel as though he had been 'set down?' "

"Not if he wants a job, Ed. If he feels that way about it he isn't the kind of a man we can bank on in the organization, and we won't cry if he leaves."

"But how will Williams feel about paying a high priced man to do a cheaper grade of work?"

"Unless I'm mistaken, Ed, he'll say it's the right thing to do. He is more interested in keeping a good organization together for the future than in saving a few dollars now. These temporary layoffs give us a good chance to clean house. Every shop gets men who don't fit into the organization and have to be weeded out sooner or later. It's unfortunate for the men and hard on their families, but I don't see how we can help it. I'm keeping my best men unless Williams objects."

Should men be retained because of ability, length of service, or size of family? Is shortening the working hours, so that all may work part time, either fair or satisfactory?

All foremen are urged to discuss these questions vital to their work; of course the

ROUND · TABLE

DISCUSSION OF EARLIER TOPICS

When Do Automatic Machines Pay?

AL IS QUITE right in his reasoning that it does not always pay to install automatic machines. In the first place, most automatics cost more than hand operated machines made to perform the same class of work, and in the second, they are usually equipped with special tools and often with special fixtures or jigs. To buy expensive equipment with any semblance of benefit, the work must be of considerable volume and importance.

I have in mind several instances of jobs that did not warrant the expense of automatic machines, even though the parts were produced at a fairly high cost on hand machines, and in batches of as many as 500 to 1,000 at a time. The first instance was that of a small pinion for an oil pump, made in thousand lots. The operation consisted in grinding two outside diameters and the tooth faces, the part being mounted on a mandrel. I was the operator, and could do the job in 75 per cent of the allowed time, which was one minute, on a Brown & Sharpe standard grinder.

We invited designs from our own designing office, and also from firms specializing in automatic machines, for a machine to do the same job, in the same time, but with semi-skilled labor. The nearest approach to the time was one minute and twenty seconds, and the machine was to cost three times as much as the plain grinder that we were using.

Another instance was that of a cam shaft grinding machine. The time with skilled labor was 2 min. 50 sec., floor to floor. The guaranteed time with an automatic machine was 3 min. 20 sec., and the operator had to load the machine.

—JAMES R. CORNELIUS, *Coventry, England.*

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Why Some Tools Fail

NO TOOL should be condemned without having had a fair and full trial. Every effort should be made to see that the tool is properly held and presented to the work. The work must also be held in the correct position, and as rigidly as possible. All the joints and bearings on the machine should be adjusted, to insure rigidity and to prevent vibration. Different speeds and feeds should be tried, not because someone said that the tool could be used that way, but for the purpose of determining the best speed and feed to use for best results.

—L. O. BROWN, *Toolroom Foreman, Holcomb & Hoke Mfg. Company.*

A Bonus for the Ambitious

I THINK we all agree that correspondence courses are sometimes of much value. And yet, among my employees I cannot point to a single case in which any kind of course, either correspondence or class room, showed that it was clearly of value. I have seen cases where it was more clearly an injury. It all depends upon whether the course was suited to the individual.

There are two principal reasons for taking correspondence courses: To prepare for another job along a different line, and to prepare for advancement in the same line. Too often the one who takes the course for the first reason, does so merely because he is discontented. Any other job looks better than his, and it always will. He may change, but he is not likely to advance. The electrical line appeals to many of these, so that I receive a continual supply of applicants who have taken electrical courses but who will never make good along electrical lines. In these cases, the employer loses an experienced man, the man loses a job which he knew, and no one gains. Some of this change would go on in any case, but it is stimulated by the advertisements of correspondence schools, and to that extent they are doing harm.

With the present enthusiasm for courses, I do not see any gain by going out of the way to encourage them. I do not, yet practically 100 per cent of my younger employees take some kind of course. There is a real value in directing the employees away from courses that cannot profit them, into those that will. I have given examinations to graduates of various mathematical courses, and it is surprising to see how seldom the graduate retains even the first principles after a year or two, and this is also true of some who received the highest scores during their course. I have found graduates of higher mathematics correspondence courses, who failed in the application of grammar school arithmetic. These students were merely wasting time in their courses that they might have spent in study for advancement in their work.—A. W. FORBES, *President, Forbes & Myers.*

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Tempering General Purpose Tools

AUTOMATIC controls are efficient, provided the tempering is done to suit each tool after its purpose is known. That can be found only by careful study of the work done by each tool, and by having the instruments set accordingly, regardless of specifications. For example, steel, hardened at 1,400 deg. F. and drawn to 500 deg. F., cannot be expected to do the work satisfactorily when 450 deg. F. would be better.

—JOHN BALLA.

*

Committees for Definite Shop Problems

THE shop committee should provide a means for representatives of the employer and of the employee getting together and discussing matters of common interest. A shop committee, efficiently organized and operated, can handle questions of shop rules and grievances, and in addition questions of efficiency of operation and

discussion is not limited to foremen. Letters accepted and published will be paid for

policies. Participation in the framing of shop rules and in the settling of grievances which arise in the ordinary course of operation is a logical field for such a committee.

Relative to having representatives of the management in on the committee meeting, the usual shop committee plan involves the selection of certain members of the shop by the employees and the selection of certain members by the employer. These members usually sit together and their decision is usually final.

If they fail to reach a decision, the constitution of the plan usually provides for an appeal to a major officer of the company. Regardless of the provisions for final authority in actions of the shop committee, it is necessary that the general management keep itself informed of what is going on and take an active interest in the proceedings.

—HARRY KAUFMAN, *Public Accountant.*

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Paying a Bonus for Temporary Work

PROFESSIONAL men always demand more for a temporary job than for a regular one. The consulting engineer, the architect, and the medical specialist prefer a run of temporary jobs, because they pay better than a regular one. The skilled mechanic who goes from job to job, if he really is a good workman, usually has a wider knowledge than the man who sticks to one job for years.

The temporary employee takes a greater risk of a long gap between jobs than a regular employee, either because he thinks it will pay him better or because he has a roving disposition. Kelly has stayed on with one firm because they suit him, and the firm have kept him on because he suits them. If Kelly prefers the status of temporary employee he is quite at liberty to get a temporary job somewhere else.

—H. J. BURNHAM, *Birmingham, England.*

THE system of paying temporary men an extra rate cannot be generally praised or condemned. It depends essentially upon the circumstances of the case. If the men who are engaged during rush periods only are residents of the town, and are forced to accept lower paid positions outside the firm during slack times, then it is only fair to pay them a bonus over the standard rate of the shop, as they are at least semi-skilled in the work that is required of them.

On the other hand, if the temporary men are picked from the habitual rolling stones, it is unfair to pay them such a bonus, as they are less efficient than the permanent workers, and they must pass through a period of training before their rate of production approaches the average.

If the temporary hands are grouped as described, and a record kept of those men who reside in the town, the compensation bonus can be paid to them, and not to stray workers. Such men should not be looked upon as temporary hands, but as permanent employees, who have to be suspended for certain periods owing to trade fluctuations.

—R. L. DORIS, *Newark-on-Trent, England.*

IT IS common practice to pay slightly higher wages to new men when increased activities make it necessary to hire more help. This is especially true when good men are scarce and jobs are plentiful. This practice does not mean that the manufacturers think more of the new men. It is their regular policy to buy man power at a reasonable price while such can be had. During rush times the demand is heavy and prices go up. It is the group of men who are willing to risk finding new jobs rather often, who receive what may seem like the "cream" to the other men. With Kelly, it seems to me that he had his inning when times were dull, and he was kept on the payroll, and that now it is the company's turn. This should even the account and not reflect on the value of his services. It is, however, often wise to grant a few increases in wages at such times to offset the dissatisfaction that usually prevails under the stress of rush orders and new help coming in at higher wages.

—L. F. SWENSON, *Industrial Engineer, Perkins Machine & Gear Company.*

* * * *

THE · NEXT · TOPIC

"The Ethics of Making a Change"

Paying a Bonus for Temporary Work

SUMMARY OF THE DISCUSSION

The employment department hired a number of men for a temporary rush period, and rated them five cents an hour above the standard rate.

When discovered, this fact caused dissatisfaction among the men who had been working for a lower rate for some years. Al defended the practice on the ground that good men could not be induced to accept a temporary job without a bonus.

THE opinion was quite generally expressed that, regardless of the justice or injustice involved in the practice of paying a rate bonus to men hired for temporary work, this practice was resented by the regular workers, and that, sooner or later, this resentment was sure to be reflected in the quantity and quality of the work produced.

Opinions differed as to the justice involved in the practice, some of the contributors holding that the regular men, because of their experience, were more valuable than the temporary ones and should be paid accordingly.

Others defended the practice on the ground that it is a common usage among professional men.

There was also a divergence of opinion regarding the remedy, if any, to be applied. Some contributors advocated a method whereby all workers would receive an increased rate during a rush period. Others thought that the dissatisfaction was caused by jealousy, and advocated that men who insisted upon a higher rate be granted one, and be placed upon the same footing as a temporary man. The difficulty of fixing a time limit during which the temporary rate should apply was not discussed.

DIES *for* *Radius Rods*

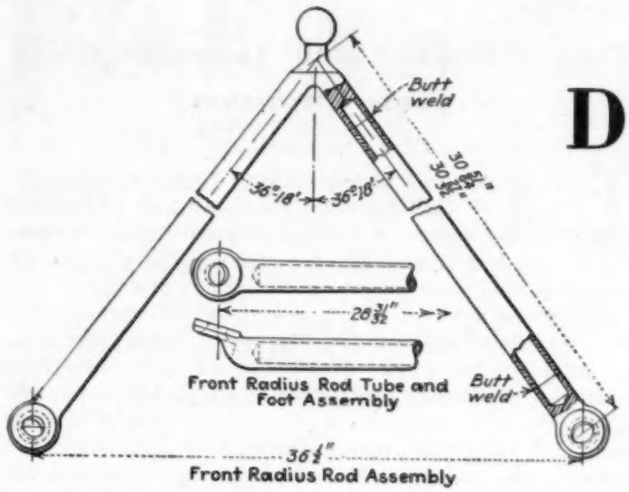


Fig. 1—Model A Ford radius rod

ONE OF the automobile parts made at the Green Island plant of the Ford Motor Company is the front radius rod for the Model T, known among automobile men as the "wishbone." This important unit is made up of three drop forgings and two steel tubes, the latter being formed in a press. In the final assembly the two tubes and the three forgings are welded in the form shown in Fig. 1. Since tubes are swaged in the forming die, no seam welding is considered necessary. The forgings are butt-welded to the ends of the tubes.

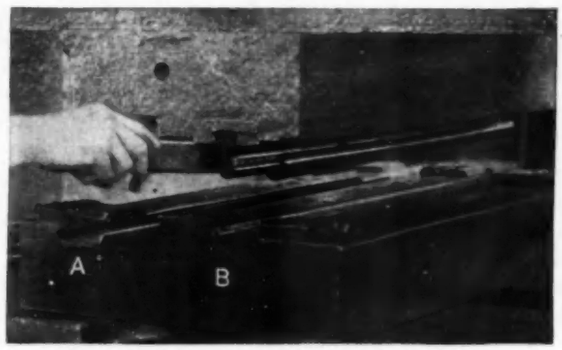


Fig. 2—Dies for the first two operations in the tube table

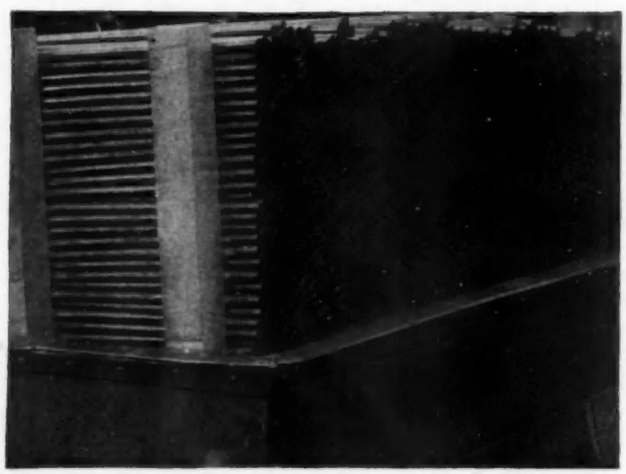


Fig. 3—Rack of tubes being transported on industrial cars

These butt welds gave some trouble at first because of the differences in the areas of metal in contact. The solution was to countersink the ends of the forgings to the same diameter as the hole in the tube. This equalized the areas in contact and eliminated all difficulty in the welding operations. The joint between the forging and the tube can be seen in Fig. 1. The holes in the two front forgings, by which the unit is attached to the front axle, are punched in a separate operation before welding to the tube.

The tube is formed of $\frac{1}{8}$-in. sheet steel and is approximately $26\frac{1}{2}$ in. long. The blanks are tapered, being about $1\frac{3}{4}$ in. at the small and $2\frac{1}{2}$ in. at the large end. They are blanked instead of sheared, so that they will not gap or overlap when formed on the mandrel.

Three operations are required to form the tube from the flat blank, the first two of these being shown in Fig. 2. The flat blank has the edges curled at *A*, and

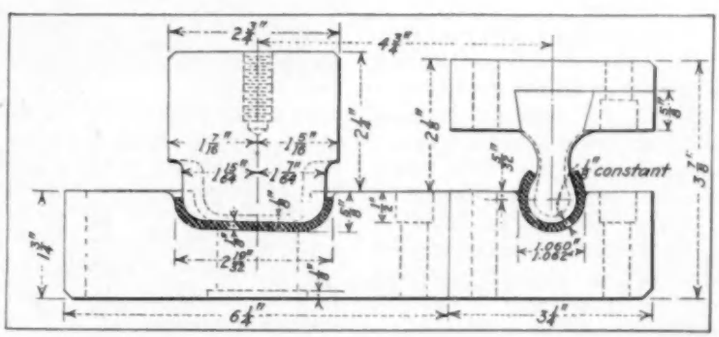


Fig. 4—Details of the curling and bending dies

The partly closed blank is pushed off the punch at the right and received by an operator at the back of the machine, who then swings around and places it in the closing die in the second press

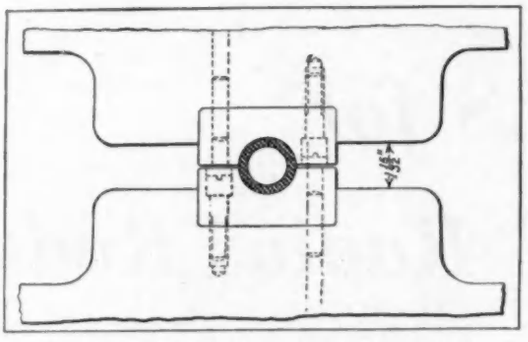


Fig. 5—Die for closing and swaging the tube

then goes to the second die *B*, where the second forming takes place as shown. The piece is stripped by pushing it toward the small end. The final operation in another press closes the tubes, and they then appear as seen on the truck in Fig. 3. The press for this closing operation is located directly behind the one for the previous operation, so that the operator takes the partially formed blanks from the first die as they are pushed back, off the tapered punch.

General dimensions of the dies for the first and second operations are given in Fig. 4. These are shown from the large end. The closing dies are shaped as in Fig. 5. The clearance is given as $\frac{1}{32}$ in. equally divided on each side of the center line. A heavy press is employed, and the sheet metal is calculated to close tightly at the joint since the only welding done is at the end joining the forgings. The closing can be done without a mandrel, and would be, if the tube was straight. A taper mandrel strips easily, and allows the tube to be struck harder. The result is a closer, better joint.

Using Blind "Ads"

By Theodore Kruger

Toolroom Foreman, The Diamond Machine Company

CERTAIN manufacturers seem to cling to the practice of using blind advertisements when they are looking for help. I doubt that the average man can demonstrate effectively his real qualifications, his degree of intelligence, and his character to a prospective employer by letter. I have known men who could write a letter that brought results, but in an interview they appeared at a disadvantage, and vice versa.

There seems to be an element of distrust in using a blind ad, or else the one using it distrusts his own ability to pick good men. Some advertisers ask a multitude of questions in hiring a man for a $30 a week job. Other jobs paying much more can be secured without answering a single question.

It appears to an onlooker that the poorer the state a firm's machines are in, the more particular the company is with regard to the man hired to run them. Ofttimes a magician could run the machines better than a mechanic. A good mechanic naturally has been used to good equipment and is at a disadvantage when it is not good.

A typical advertisement reads like this: "Wanted, machinist foreman capable of turning out first-class work. State wages, experience, and all particulars." The foreman does not turn out the work himself, and the advertisement gives no particulars as to the class of men employed or the condition of the equipment. In fact, the applicant often finds himself helpless if he accepts.

German Practice with Tungsten-Carbide Tools—*Discussion*

By C. G. Crowley

THE article on tungsten-carbide tools, on page 37, Vol. 71, of the *American Machinist*, has cleared up many of the questions which the production executive has asked, but these tools are new and they introduce problems which can only be ironed out in practice.

While the tendency to try new things is inherent, it is true that there are often advantages in making the most of what one has rather than going out after something untried. For many applications, the tungsten-carbide tools offer big economies, a material increase in production, and radical changes in production methods. For other shops, however, immediate improvement is more easily possible in other ways.

As Dr. George Schlesinger points out, many machine tools at the present time are unable to utilize fully the possibilities of the tungsten-carbide tools. This suggests the question, as to the extent to which the present so-called high-speed steels are being utilized.

Many production executives are looking for authoritative data covering the tungsten-carbide tools. Specifically, they want to know the applications in which they are fulfilling expectations, and to what extent the cutting speed must be changed.

With this new cutting material available at prices approximating $1 per gram, and with from 5 grams up to 90 grams being required for each tool, there is the problem of storing and safekeeping this precious metal. After the production executive has obtained his tool tips, he faces the problem of applying them to the tool. There is the cost of the holder and the cost of brazing. This, too, embraces the problems of how best to braze tips, and how best to shape the tools.

For those located in the larger industrial centers, these problems are not so very real, because somewhere near at hand is a representative who can give them the facts they seek. There are many men less fortunately situated, however, who want to find out what this new material can do for them, and who want to know in advance what it will cost them to find out. These men are looking to the technical journals for such data and information.

A QUESTIONNAIRE sent out recently in a safety campaign asked what, in the worker's judgment, constituted the four most common ways of getting hurt on the job upon which he was working. About 80 per cent of the employees tried to co-operate in the work, some of them giving more than four causes of accident. Some even turning the sheet over on the reverse side and giving eight or ten. Such questionnaires, delivered to the employees, usually result in safety as a general topic of conversation for several days following the campaign. Information compiled from the questionnaires showed improper or unsafe piling and inattention to be leading causes for accident. Protruding nails and metal binders, incorrect lifting, carelessness and defective equipment were also near the top of the list. Accidents resulting from poor loading of trucks and skids, and from refusing to wear gloves were frequently reported as important causes.

IDEAS FROM PRACTICAL MEN

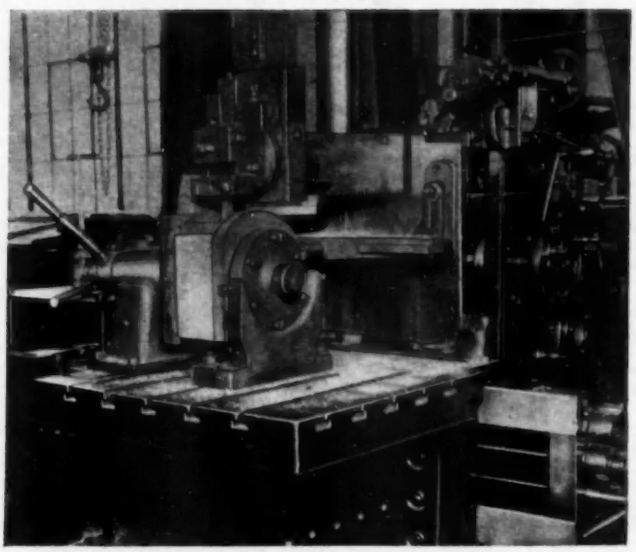
The department, "IDEAS FROM PRACTICAL MEN," is devoted to the exchange of information on methods useful to the machinery industries. Its scope includes all divisions of the metal-working industry, from drafting room to shipping platform. Descriptions of methods or devices that have proved their value are carefully considered, and those published are paid for. The rates are from a minimum of five dollars upwards, depending upon their merit.

An Indexing Mandrel for Main-Rod Brasses

BY HENRY H. HENSON
Cincinnati, New Orleans & Texas Pacific Railway Company

Nearly every railroad shop has a different method of machining brasses to fit the forked ends of main rods. The usual method is to hold the brasses by means of a vise in a planer or shaper, and to square up the faces for each cut.

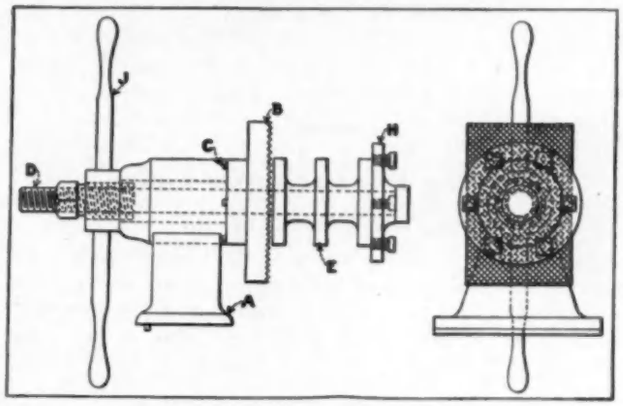
The indexing mandrel shown in the shaper in Fig. 1, and fully assembled in Fig. 2, combines convenience and accuracy in indexing the brasses. It is of such size that all sizes of rod brasses can be accommodated. The mandrel is mounted in the base *A* into which is fitted the tapered shank of the faceplate *B*. The faceplate is checkered to prevent the brasses from slipping. On the front of the base are eight equally-spaced notches *C* into which fit keys, or projections, on the back of the faceplate. Eight stations are thus provided for shaping the channels for fitting into the rod fork and for chamfers for clearance in the corners of the strap. Through the



The mandrel and work in a draw-cut shaper

center of the faceplate and its shank passes the drawbolt *D*. A key prevents the drawbolt from turning in the shank of the faceplate, but permits such endwise movement of the shank as is required for indexing.

Mounted on the drawbolt is the bushing *E* a number of varying sizes of which are provided to fit brasses having different bores and lengths. The brasses are



Assembly view of the mandrel

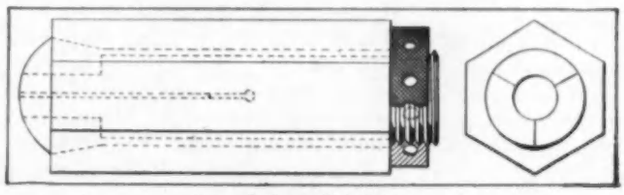
rough bored to fit the bushings, and each bushing is $\frac{1}{4}$ in. smaller than the crankpin for which the brass is intended. The bushings are grooved to reduce their weight. Keyed to the drawbolt is the collar *H* which has six setscrews to hold the brass firmly against the checkered surface of the faceplate. By sufficiently unscrewing the two-handled nut *J*, the faceplate may be moved far enough forward to disengage the keys from the notches *C*. The faceplate can then be indexed, bringing the brass to the next position for machining. The nut *J* is then tightened. Each succeeding position is indexed in the same way.

In Fig. 1 a steadyrest is shown under the outboard end of the mandrel. This part of the device is rarely used, except for very heavy cuts at coarse feeds. The steadyrest acts as an outboard bearing and fits under and partly around the collar *H*. The machining time for brasses depends largely upon the kind of machine used and the man operating it. Usually the time is one hour for each brass.

A Holder for Collets—*Discussion*

BY ARTHUR F. PARKER
Instructor in Charge, Machine Tool Laboratory, University of Michigan

The holder for collets described by Theodore Kruger in an article under the title given above, on page 260, Vol. 71, of the *American Machinist*, brings to mind a set of similar holders I made some time ago. The hold-



One of the collet holders

ers were very useful, and I believe they are an improvement on Mr. Kruger's idea.

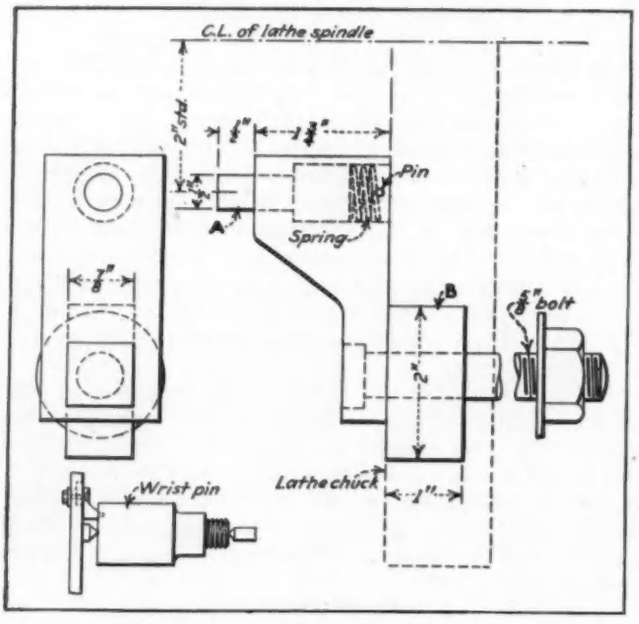
Instead of making but one holder, I made two—one hexagonal and the other octagonal, thus allowing a triangle, a square, a hexagon, or an octagon to be milled by placing one of the holders in the milling-machine vise, and shifting it for the successive faces. Both holders were hardened, and were ground all over. The accompanying sketch shows the hexagon holder and serves to illustrate the idea.

One useful purpose for which either of the holders can be used, is the slotting of screw heads, either in a machine or with a hacksaw. In the latter case the holder can be gripped in a bench vise.

Driving Pin Used in a Lathe

By Frank J. Oliver, Jr.

It is the practice in the shops of the Chicago & Northwestern Railroad to drive all main rod wrist-pins, during turning operations in a lathe, by means of a pin engaging a hole drilled in the end of the piece. This obviates the necessity of dogging the work, a procedure that not only



Driving pin for lathe work

wastes time when a lot of fitting has to be done, and necessitates frequent removal of the piece from the lathe, but also damages the work because of marks left by the set-screw. With the use of the driving pin the work is driven positively, and can be set up in as little time as it takes to place the piece on centers.

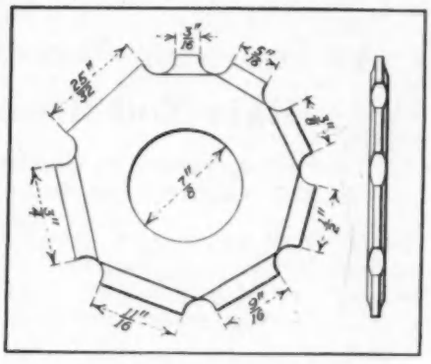
In the illustration is shown the device used to mount the driving pin on the faceplate so that it can be adjusted radially. Pin *A* is ½ in. in diameter, and it engages a hole $\frac{9}{16}$ in. in diameter drilled in the work, in most cases, at a distance of 2 in. from the center. These driving pins are subject to wear and are, therefore, made readily removable. As can be seen, a coil spring holds the pin in a drilled pocket in the main driving piece. Lug *B* is integral with the body and engages the slot of the faceplate of the lathe. A ⅝-in. bolt clamps it in position.

A Multi-Bladed Screwdriver

By Samuel Kauffman

In setting and adjusting dies in a press, there is not much room to use a screwdriver of the ordinary type, owing to the closeness of the punch holder to the die shoe.

The multi-bladed screwdriver, shown in the illustration, provides a means for tightening or loosening screws in close quarters. Also, it has the following advantages: It is compact, eight sizes being taken care of by just one tool; it takes up little room in the tool box; and it permits more turning pressure to be put on the screws than with the ordinary screwdriver, the leverage being about four to one in its favor.



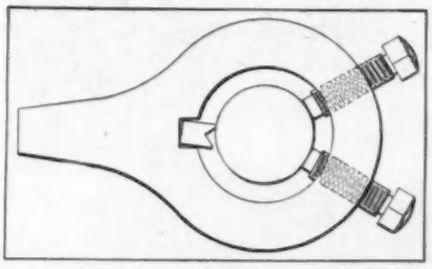
An eight-bladed screwdriver for close quarters

The tool should be hardened and drawn to screwdriver temper, and the blades should be ground to thicknesses that will fit closely in the slots of the several sizes of screws on which it is intended to be used.

A Non-Slipping Lathe Dog

By D. D. Vandercook

In our shop we use lathe dogs that have been treated, as shown in the sketch, to keep them from slipping. The sketch is somewhat exaggerated to show the principle of the device. As may be seen, the hole in the dog is round, and a groove has been cut opposite a point midway between the clamping screws. An old piece of toolbit, having an approximate V ground in it, is fitted very loosely in the slot. The driving pressure causes the toolbit to cant and bite into the work. The amount of bite, or pressure, on the work can be regulated by using a larger or smaller toolbit.



A lathe dog that will not slip

By using a lathe dog that would ordinarily be considered much too large, and inserting a piece of steel ½x1 in. and 2 in long, having the V ground in the ½-in. face, sufficient driving pressure can be developed to split a 2-in., cold-rolled shaft.

We employ the ends of used toolbits for the steel inserts, and find them very satisfactory. I have never known one to slip more than a quarter of a revolution.

Business Ethics

Die, Tool, Special Machinery, and Manufacturers' Association

Planned especially for the small contract and jobbing shop, this code of ethics is also directly applicable to the great number of small and medium-sized manufacturing plants that do not have elaborate accounting and personnel systems. It may be considered to contain the essentials of good management for any manufacturing plant

Our Duty to Ourselves

1. Every transaction should be tested by the standards of truth and justice.
2. A client's ignorance of conditions is no excuse for taking advantage of him in a business transaction. Employees must be impressed with the necessity of being straightforward and truthful, and neither misrepresenting nor overcharging.
3. Every manufacturer should be just as honorable in every particular as he wishes his competitor to be.
4. Interchange of ideas and co-operation are mutually advantageous. A reputation for straightforward action and honesty as a manufacturer is to be desired.
5. A system should be used by which the actual cost of every job may be ascertained. In this way only can business be relieved of the deleterious effects of unfair prices.
6. Exact, systematic bookkeeping is essential. All work should be checked and charges proved before delivery, and no charge should be entered on the books that cannot be proved to be a fair competitive price.
7. The expense of doing business, such as wear and tear on equipment, interest on money invested, bad debts, rents, taxes, insurance, bookkeeping, and all other items of expense should be kept in mind, and should be levied on each particular job as a part of its cost. The minimum cost plus a fair profit should be the basis for setting a price.
8. On no account should commissions be paid to bookkeepers, secretaries, or others who have work to give out. It is demoralizing to both giver and taker.

Our Duty to Each Other

9. A young competitor entering the business should be given all possible assistance and information.
10. Less-experienced competitors should be given any knowledge which the more-experienced manufacturer possesses, and which he is sure will be used honorably.
11. Labor charges should be comparative, whether the organization employs one man or fifty. The operator of the small shop should rather insist that work he turns out be better done than it would be in the larger shop.
12. When offered work which cannot be done with limited facilities, it should be declined, and the customer referred to an establishment that can handle it. No work should be accepted in the hope that some neighbor may do it and allow a commission.
13. No rebates or allowances should be made to professional brokers or middlemen. If it is possible to help a neighbor out of an extra rush of work, it should be done, and the profit shared.
14. When estimates are asked for on work done by a competing manufacturer with plain intent to find cause for alleged unfairness in price charged, they should not be given. It is not safe to criticize any price when not in possession of the facts.
15. In making an estimate, it should be remembered that a competitor may be injured and antagonized by an unfair one.

Prices and Estimates

16. A thorough knowledge of costs and a predetermined percentage of profit should provide the basis for the setting of a price, whether secured by a competitive bid or without a price having been named in advance.
17. No estimate should be made on work which cannot be done with available facilities or experience. It is always unsafe and often unjust to give prices on a class of work for which the cost is not positively known.
18. Fair remuneration should be asked for any work offered. It is more profitable to be without a job than to secure one in which there is temptation to resort to questionable methods to avoid loss in execution.
19. Estimates calling for detailed specifications of the value of separate items should be refused. The customer has no right to these details.
20. In making estimates for work or in submitting proposals in answer to advertisements, the only price proper to make is that one which would be made if the work were given without an estimate having been requested, on the basis which has been adopted as a minimum for each class of work, determined from experience.
21. A bidder is entitled to know the names of others who are to bid on the work. Each bidder is also entitled to know the prices offered for the work and to whom and at what price it is awarded.
22. The man who asks for a bid, and before receiving it, shows the figures offered by another bidder, should be avoided; if he will show another's bid, he will also show the one he is requesting in an attempt to get a lower price.

Our Duty to Our Workmen

23. The employer should make it his consistent endeavor to aid his workmen in every possible way.
24. Unfair demands of employees should be investigated and proper action taken only after the investigation.
25. Any action which tends to decrease the rate of wages should be looked upon with as much distrust as an effort to increase them.
26. Care should be used in the assignment of apprentices or boys, for they are often influenced for good or bad by the example of the foreman under whom they work.
27. When an apprentice is taken, it is a duty to advise him to seek another trade if he proves inapt or unteachable.
28. When the apprentice taken in is competent and will learn his trade in a manner to reflect credit upon himself and upon those who have taught him, no effort should be spared to make him all he should be as a workman and a citizen.

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Equipment Modernization in 1930

OPTIMISTIC statements on the soundness of business have been issued, and will continue to be issued because they are based on fact, but even so every sensible man should recognize that the months ahead are probably going to see a tightening up all along the line. Those companies that have been able to get by with obsolete production equipment because of the hunger of their markets, and the willingness to pay a little more in order to get immediate deliveries, are going to be faced with competition from the strong, well-equipped organizations that will either force them to the wall or require them to re-equip and modernize.

During the rushing prosperity which has prevailed throughout the past year, many users of metal working machinery have hesitated to embark on replacement programs because of the attendant dislocation of their production schedules. Others have been unable to do as much as they wished because of the long deliveries in effect during most of the year. Those handicaps seem likely to be removed now, or at least diminished, and there is consequently no good reason why extensive replacements should not be made so that the plants will be ready for large-scale, highly efficient activity when any lull is over.

It will not do to postpone action, because any lull will probably be of short duration. After all, we have not speculated in commodities, nor in land, nor in equipment—only in stocks. And the stock speculators have been individuals, and not companies. Consequently any lull will be psychologically rather than economically supported, and that support will vanish as soon as business recognizes the fact that the market recession was a healthy reversion to real values, and not a premonitory sympton of general collapse.

The equipment builders will do well to concentrate their whole selling efforts on getting replacement programs under way immediately. Not only will it be good business for them, but healthy for the industry and for the country as a whole.

Depreciation and the Associations

NOT SO MANY moons ago the U. S. Treasury Department suggested that trade associations undertake a co-operative study of rates of depreciation for machinery and other industrial equipment. Some progress was made, but no terminal point reached. Whereupon, the Treasury Department announced that it would discontinue such studies and would issue a publication containing rates of depreciation for general guidance.

A certain uneasiness, amounting almost to open suspicion, followed hard on the heels of the announcement. Would the Treasury dictate rates of depreciation? Would industry have no hearing? Would there again be "taxation without representation?"

The uneasiness is premature and quite out of line with the facts. On investigation it is found that the members of many associations could not themselves agree upon standard rates. Members of others refused or lagged with their co-operation. Purely as a time-saver, the Department was forced to add to its investigating staff and to go its rate-determining way alone.

This, in the words of a member of the Department, does not mean that the Department has decided to establish fixed and mandatory rates. Nor does it mean that co-operation from trade associations will be discouraged and refused. It means simply that guiding rates must be established, printed, and published, well before the first of this coming March.

These rates are and will be guiding rates. If they fit the facts in your own particular business, use them. Should they allow but five per cent on a machine whose useful life is only ten years, figure your depreciation at ten per cent. The express intention of the Treasury is to work fairly with business and not against it. The most arbitrary field agent is bound to be ruled by honest facts. The Treasury Department will always welcome sound and timely co-operation from trade associations.

*

THERE are American manufacturers and export traders who forgot the United States has never opened diplomatic relations with the U. S. S. R. It is earnestly suggested that all who would trade with Russia or her agents confer with the U. S. Department of Commerce before signing any contracts or agreements.

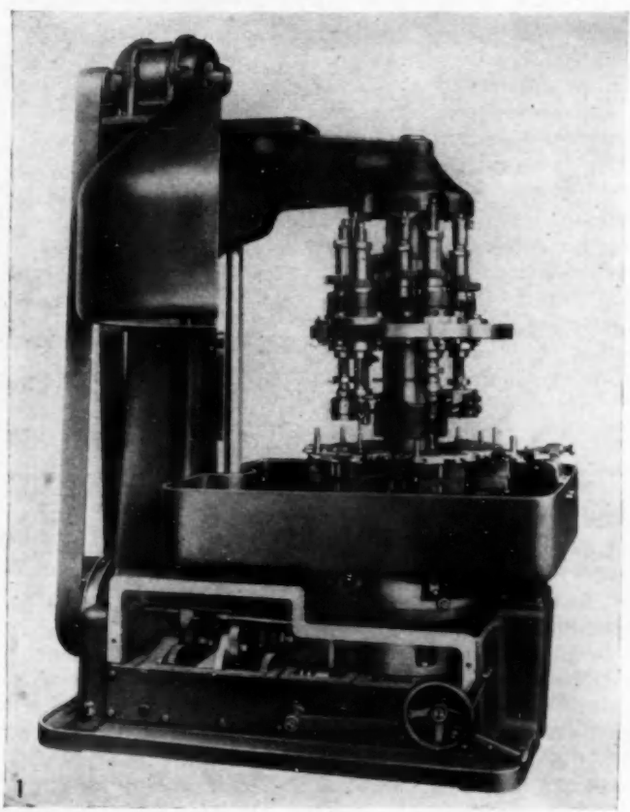
SHOP EQUIPMENT NEWS

Pratt & Whitney No. 2 Six-Station Vertical Automatic

FLEXIBILITY in set up and high-speed operation are the chief features of the No. 2 six-station vertical automatic placed on the market by the Pratt & Whitney Company, Div. of the Niles-Bement-Pond Company, Hartford, Conn. When properly tooled, the machine will perform a large variety of operations, including milling, drilling, sawing, facing, threading, tapping, hollow milling, reaming, serrating, knurling, and boring. Five of the stations are tooled and the sixth is for loading. Intricate machining operations are carried on at high speed with consistent accuracy. For example, valve stems, guide bushings, fan hubs, bearing cages, various small shafts, and numerous other parts may be handled where there are multiple operations to be performed on large quantities. The parts may have holes off center, and various machining operations on different center lines can be finished in the same set up. Multiple cutting tools on a single spindle are means of speeding up operations. Multiple drill units, combination facing and drilling devices, and others may be used.

Simple operation is another important feature of the vertical automatic. The operator inserts a blank at the loading station and the machine table rotates to the right, bringing the blank under the first working spindle. The work is moved vertically against the revolving tools by cam action until the operation is completed, after which the work is lowered again. The table then moves on to the next spindle where a second operation is performed, and so on until all five spindles have completed the piece. By that time it has returned to the loading position where the operator removes it and inserts a new blank with a minimum of effort.

The vertical automatic is designed for individual motor drive, with full electrical equipment, including push-button control. A 7½-hp., constant-speed motor is mounted on top of the column and connects by belt with the main driving pulley at the rear of the bed. Power is carried into the gearbox in the bed and is transmitted to the spindles through the large vertical shaft in front of the column, and a set of change gears in the head. From the gearbox the power is also transmitted through a clutch and a worm and wheel to the table mechanism.



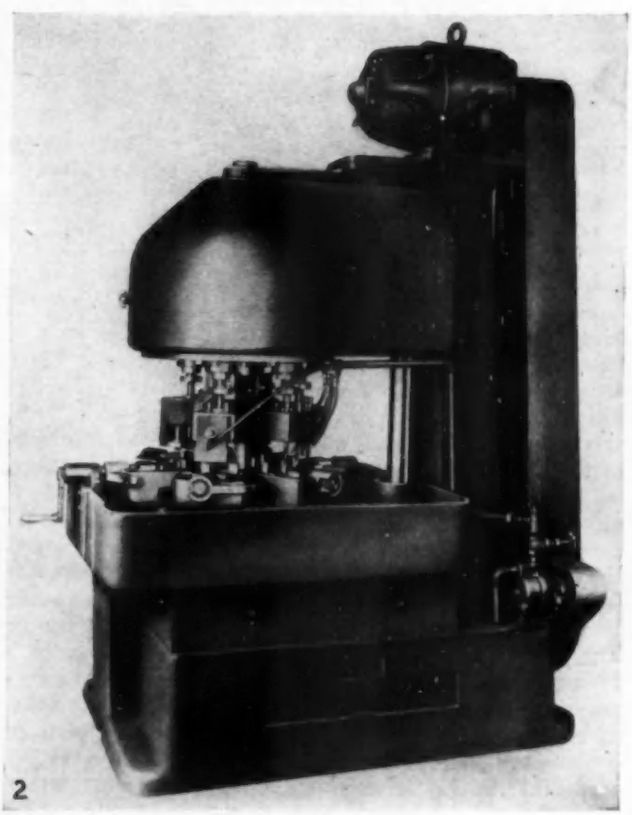


Fig. 1—Pratt & Whitney No. 2 Six-Station Vertical Automatic, showing spindle gearing, work elevating cams, and gearbox that runs in oil. The spindle mechanism and the compounding gears and the outboard supports are visible.
Fig. 2—View from the opposite side. The coolant pump is driven by belt from the main drive shaft

By means of the two sets of change gears, the speeds of the spindles and the table are controlled separately. A friction clutch operated by a foot lever stops the movement of the table without stopping the spindles.

The gearbox in the bed is completely inclosed and the gears run in oil. An oiler on the side of the bed makes filling easy and maintains the correct oil level inside. Removable covers on the side of the bed provide easy access to the interior when changing speeds. This type of gearbox construction keeps out all dirt and

SPECIFICATIONS

Range:	
Maximum distance from flange of work-holding spindle to flange of cutter spindle, with work-holding spindle in lowest position, in.	14½
Maximum travel of work, in.	3½
Maximum adjustment of cutter spindle, in.	6½
Maximum work diameter swing, in.	8½
Speeds:	
Cutter spindles are independent of each other; approx. speed 150-1,500 r.p.m. without using reduction unit having maximum ratio 3 to 5	
Motor speed, r.p.m.	1,150
Main drive pulley (16 in. diam.) speed, r.p.m.	400
Feeds:	
Work holding spindle feeds by cams to suit work	
Floor space and weight:	
Length and depth, approx., in.	40 x 74
Height (not including motor) approx., in.	81
Weight, without motor and tooling, net, lb.	6,750

insures long life and quiet operation. A pump inside this gearbox supplies oil to the head, which is arranged to supply a drip oil feed to the spindle drive mechanism and the work tables. This pump also supplies the table driving parts. The only oiling attention the vertical automatic requires is the filling of the large gearbox reservoir in the bed and the oil cup on each idler spindle.

The work tables index progressively from one spindle to another and are locked in each position automatically. The vertical movements of the work during cutting are controlled by cams placed on an oscillating ring under the table. These cams move back and forth, each one remaining under its particular spindle at all times. The cam followers are rollers on the lower ends of the six work table elevating spindles, and move progressively from cam to cam as the work advances from spindle to spindle. Each cam is designed with the correct slope and rise to feed the work to the tools on the spindle above it at the correct rate for the particular operation being performed. The loading position has no cam and the work remains stationary while the operator changes the piece. When changing setup these cams can be removed quickly and others substituted.

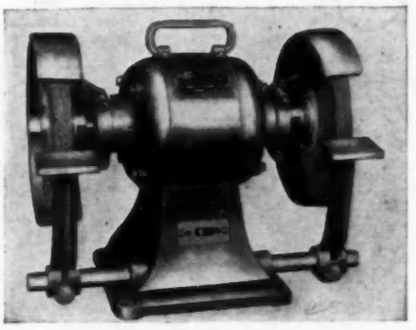
Power from the vertical drive shaft is taken to the spindles through bevel gearing, and a large central gear meshes with the separate gear trains for each spindle. Each work spindle has an idler spindle carrying compounding gears. By this means the speed of each individual spindle can be controlled as desired through a wide range.

The spindles themselves are carried in a large circular bracket and are supported rigidly in sleeves mounted in widely spaced ball bearings. Each spindle is threaded its entire length so that the tools it carries can be positioned vertically and locked in place. During operation the spindles revolve but do not move up and down. Throughout the machine all major thrusts are carried on ball bearings.

Regular equipment on the motor-driven machine does not include motor or electrical equipment, but does include complete tooling to suit the customer's work. This includes work-holding devices, spindle tooling, cams, and pump and piping for coolant, if needed. The motor and electrical equipment, which are extra, consist of a 7½-hp. constant-speed motor, either a.c. or d.c., that operates at 1,500 r.p.m. and also an automatic starter providing overload and under-voltage protection.

Van Dorn 7-Inch Bench Grinder

For sharpening all sorts of edged tools and for light grinding, a 7-in. bench grinder has been announced by the Van Dorn Electrical Tool Company, Cleveland, Ohio. The machine is a compact, sturdy, ball-bearing grinder with the ball bearings mounted in dustproof housings. It is smooth running and vibrationless at all speeds because of its dynamic balance. It is furnished



Van Dorn 7-Inch Bench Grinder

complete with grinding wheels, adjustable toolrests, wheel guards, switch and cable, and is available for all standard voltages and currents.

Gibb Welding-Electrode Pressure Meter

For indicating the pressure obtained at the electrodes of welding machines, a pressure meter has been announced by the Gibb Welding Machine Company, Bay City, Mich. This pressure meter operates by hydraulic pressure, the oil reservoir being formed by seam welding the edges of two stamped disks. The seam weld is leak-proof.

To determine a certain welding pressure, the oil filled disk portion of the meter is placed between the elec-

Gibb Welding-Electrode Pressure Meter

trodes of the welding machine and the pressure applied is registered, in pounds by the indicating part. The outstanding advantage of the meter is the fact that welding machines can be set to the exact pressure desired.

Also, the pressure meter facilitates the recording of the correct pressure for certain welding jobs. A welding

machine may be set up and adjusted for a certain production run. The pressure meter makes possible the accurate recording of the proper pressure for that job. After completion of the above mentioned run, the machine may be set for an entirely different run, and the pressure indicated by the meter is recorded for this run. With the meter, the operator can quickly and easily reset his machine for more of the first run.

The pressure meter is small and compact, having a highly polished chrome-plated surface. The complete unit weighs approximately 2 pounds.

Barber-Colman Type "B" Production Hobbing Machine

DESIGNED as a manufacturing machine for roughing and finishing spur gears, spline shafts, and similar forms, this gear hobbing machine is being introduced by the Barber-Colman Company, Rockford, Illinois. Special attention has been given to the distribution of metal and the proportions of component parts in order that the machine will operate at the extreme feeds and speeds possible with the present-day high-speed steel hob, and will still maintain its accuracy over a long period of time. The capacity of the machine is indicated in the accompanying specifications.

Principal features of the design are: Work-diameter control by means of an elevating bed, work spindle mounted in a housing fast to the base, centralized interlocking controls, direct-connected motor drive, a unit pressure-oiling system, Timken precision roller bearings on hob and work spindles, and roller and ball bearings on other parts, worm and worm gear final drive to the hob, a hob-spindle drive outside the bed allowing the hob to swivel on a center under the work, automatic continuous lubrication of the feed-box, a hob-slide power rapid traverse, hardened spiral bevel gears throughout, and a screw and micrometer dial for positioning the hob.

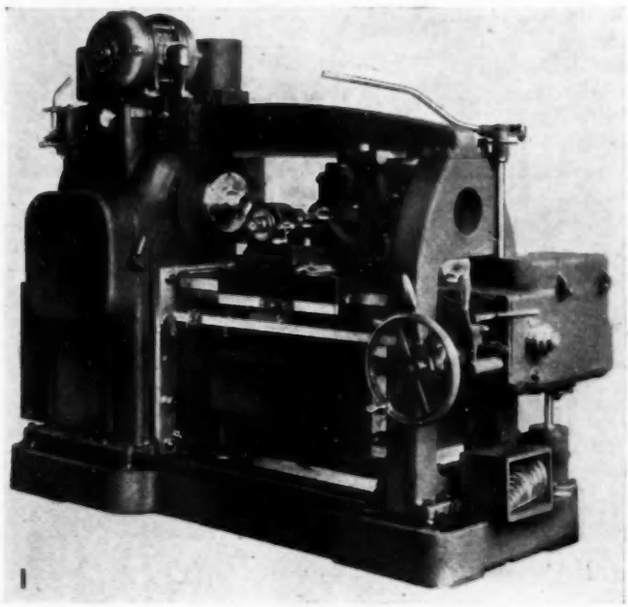
The main frame has a heavy base casting which acts also as an oil reservoir. The main upright is a box-section casting, mounted at one end of the base, which carries the drive and index elements and also the main work spindle as a complete unit. At the opposite end of the base is the auxiliary upright. Both uprights are hand scraped on their inner sides to form the ways upon which the elevating bed is raised and lowered. This allows minute adjustment for diameter of work, and preserves a horizontal type of machine. Heavy bed clamps provide stiff construction.

Timken tapered roller bearings are used in the main upright to provide a bearing for the work spindle. The front end of the spindle is fitted with a No. 12 B & S taper. However, the through hole in the spindle, and the face of the spindle can be suited to hold and drive a wide variety of work.

The outer support to the work may be either a center or a bushing sleeve and is carried in an outer bracket or tail center bracket fitted in alignment with the work spindle, and adjustable along the cast-iron

SPECIFICATIONS

Capacity, diametral pitch, cast iron	3
Capacity, diametral pitch, steel	4
Center distance between work spindle and hob, minimum, in.	2
Center distance between work spindle and hob, maximum, in.	8
Maximum travel of hob carriage, in.	16
Diameter of hob spindle, in.	1¼
Maximum diameter of hob, in.	4½
Taper hole in work spindle, B. & S.	12
Standard hole through work spindle, in.	1 11/32
Feeds, inches per minute, in	0.081 to 10.720
Hob speeds, r.p.m.	55.1 to 159.4
Number of changes of hob speed	8
Motor, hp., speed	7½, 1,750
Floor space, in.	42 by 92½



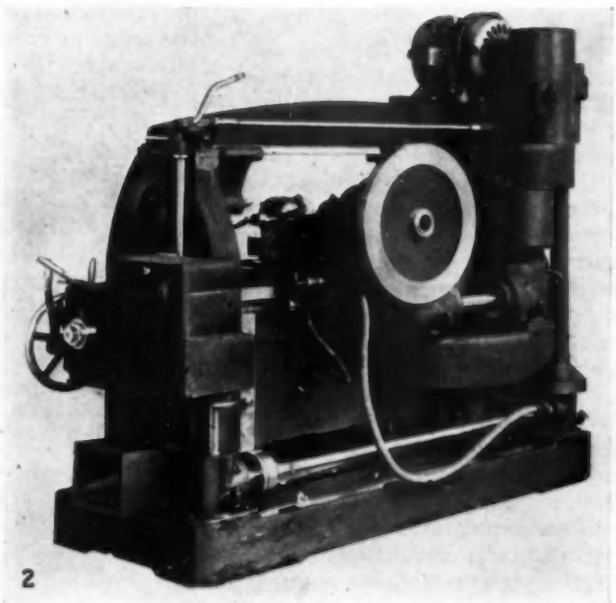


Fig. 1—The Barber-Colman Type "B" Production Hobbing Machine. Fig. 2—A rear view of the machine, showing the drive arrangement

overarm, or bridge, which ties the upper ends of the upright together.

A hardened steel worm driving a bronze-rimmed worm gear of large diameter is used to index the work

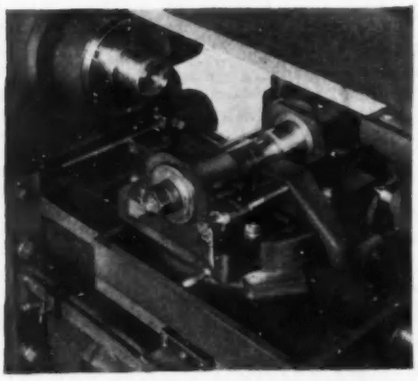


Fig. 3—The hob carriage seen from the front. The mounting for the spindle bearings and some of the connections of the oiling system can be seen. Note screw and micrometer dial for positioning the hob

spindle. Accurate and convenient adjustment is provided for maintaining a running fit between the worm and the gear. Heavy change gears are provided.

The hob spindle is hardened and ground and is mounted in Timken tapered roller bearings, the main bearings being set in seats bored in the hob slide and the outer bearings being mounted in a removable bushing so that hobs may be changed. The hob slide is adjusted by means of a screw to position the hob endwise, and is then clamped in place. The worm-gear case and the bevel-gear case, which slides on the main drive shaft, are separated on this machine, and are joined with a swivel fit, so that alignment with the hob spindle may be preserved by the worm gear case, no matter at what angle the hob spindle may be set. The whole unit is then clamped together. The hob swivel slide is driven by a shaft outside the bedways.

The bed on which the hob carriage travels is supported on two elevating screws with elevating bevel pinions and gears, geared to the operating handwheel. Graduations provide for setting the height of the bed to 0.0005 in. The entire arrangement is claimed to provide for parallelism of work. The main driveshaft is splined and its drive end is carried in a case at the front end of a long bracket which forms part of the bed. The vertical drive shaft is also splined, and it, together with the change-gear shaft, is carried in a casing mounted on the main upright. The drive change gears are splined to the respective ends of the shafts on which they are interchanged. Spiral bevel gears connect the motor to the machine. In addition to the motor controls, an automatic stop on the machine operates a friction driving clutch interposed between the motor gears and the main drive gears.

Feed-box drive is obtained by an independent shaft running directly from the motor. This shaft provides power for any selected feed, or for quick traverse movement to the hob carriage in either direction. Interlocking levers are mounted on the feed-box to control both of these movements. Sufficient range of feed is provided to meet the needs of slow or heavy feed on any work within the range of the machine. The feed mechanism, the main drive clutch, and the quick traverse movement can be tripped automatically at any desired point.

All bevel gears on the machine are of the spiral type, and all bearings are either Timken roller bearings or heavy-duty ball bearings. The oiling system throughout is of the pressure-feed type, the feed-box unit being automatic. The coolant pump is of the low-pressure, large-quantity type, mounted over the base under the main upright, and driven by a V belt.

Apex Friction Chuck for Electric and Air Tools

The multiple-disk safety friction chuck illustrated in Fig. 1 is manufactured by the Apex Machine Company, Dayton, Ohio. It is furnished with a shank to fit any electric or air tool, and with a hole in

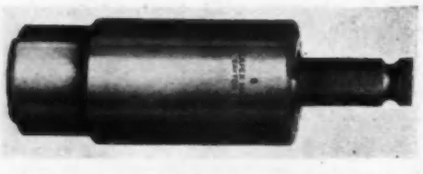


Fig. 1—Apex Multiple-Disk Safety Friction Chuck for use with electric or air tools

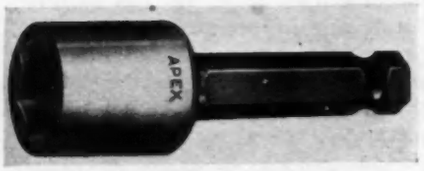


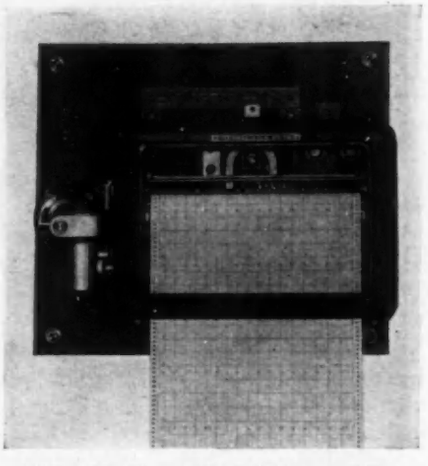
Fig. 2—Nut setter for use with electric or air tools

the bottom to take any make of socket wrench, screw driver, bit, or other similar tool. When the friction is set to the desired tension, a uniform setting is obtained and the slippage of the friction means prevents damage to the tool. Chatter and vibration are minimized so that the operation of the device is not tiring to the operator.

Nut setters, shown in Fig. 2, are made of special alloy steel. In addition to these, stud setters with alloy-steel sleeves and screw driver bits are furnished with shanks to fit any make of electric or air tool.

Wilson-Maeulen Model 8201 Potentiometer-Type Recording Pyrometer

Having three chart speeds and a temperature recording chart 12 in. wide, the Model 8201 potentiometer recording pyrometetr has been placed



Wilson-Maeulen Model 8201 Potentiometer-Type Recording Pyrometer

on the market by the Wilson-Maeulen Company, 383 Concord Ave., New York, N. Y. In this potentiometric recorder, when the measured voltage from the thermocouple changes, as a result of temperature change at

the thermocouple, the galvanometer pointer deflects in the corresponding direction. At intervals of 10 seconds the carriage moves the pen to record on the chart the temperature of the thermocouple, giving an accurate record of fluctuating conditions.

The three chart speeds are ¾, 1½, and 3 in. per hour, which permit the user to secure the chart speed most suitable for his needs. On operations where temperature changes are slow and long periods of time are involved, the slow speed condenses the record and makes observation of trends and cycles easier. For temperatures that fluctuate rapidly and short cycles of operation, the faster speeds allow more detailed analysis of temperature changes. Charts are available for a wide selection of scale ranges in both the Fahrenheit and Centigrade systems to suit various types of thermocouples, and to suit the various temperatures of industrial operations. For low temperature operations, 600 deg. F. down to zero or lower, this same recorder is supplied to operate as an electric thermometer employing resistance bulbs. One of the features is the ink which has a brilliant red color and dries quickly on the record before the chart emerges from the case.

An external drive unit, consisting of an ample-sized motor and double worm-and-gear speed reducing system located outside the instrument case, furnishes power to the instrument mechanism. The drive unit provides ample power for operating more than one instrument. It is supplied with this recorder for either 110- or 220-volt a.c. circuits.

Busch-Sulzer Hydraulic Molding Press

SMALL parts that lend themselves to plastic molding can be produced rapidly and economically on the hydraulic molding press developed by W. G. Altpeter and D. V. Waters, development engineers of the Western Electric Company, by employing certain features covered in patents issued to G. Howlett Davis. The machine, however, is manufactured and marketed by the Busch-Sulzer Bros.—Diesel Engine Company, 3300 South 2nd St., St. Louis, Mo. It consists essentially of two presses in one, a main press incorporating the heating station, and a sub-press embodying the cooling station, with a table revolving about a central column, as shown in Fig. 1, to transfer the mold from one to the other.

The heating station is at the rear. It consists of an upper stationary platen and a lower platen which is raised by the main hydraulic ram and lowered by hydraulic pull-backs. When the lower platen is raised, it lifts the mold from the revolving table and presses it against the upper platen. Both platens are equipped with steam heating channels that heat the molds by conduction. The cooling station is of tilting head construction and is similar to the heating station except that the upper platen is attached to a tilting head equipped with hooks for lifting the upper half of the mold. The capacity of the subpress ram is less than that of the main ram, since it is used only during cooling and to close and strip the molds. The platens at the cooling station are equipped with water-cooling channels.

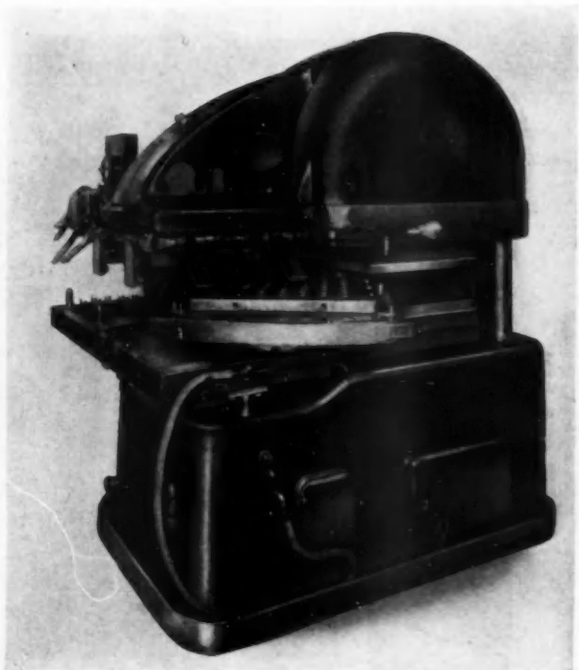


Fig. 1—Busch-Sulzer Hydraulic Press for Plasic Molding, showing the molds being indexed 180 deg. about the column. One station is for heating one mold and the other for cooling the second

There are two sets of dies in constant use. While one mold is being heated, the other is being cooled, unloaded, and refilled for the succeeding cycle. The time required for the operation at each station is about the same so that the total time lost in each cycle is that consumed by rotating the table. In a single type press the time cycle for one operation must include in consecutive order, heating, cooling, unloading, and loading. The same sequence, of course, occurs in this press, but the time cycle is shortened to the time consumed in the heating operation. The dies used in the machine illustrated mold the mouthpieces used on telephone transmitters—forty-nine of these mouthpieces are turned out by this machine every four minutes. Much larger parts can also be produced.

The operation of the press is as follows:

1. With the empty mold in position on the revolving table at the cooling station, the tilting head is lowered, the stripping fixture is rolled under the mold and raised by the sub-press ram. As the top half of the mold comes in contact with the tilting head it is retained in that position by hooks which hold it while the tilting head is raised, lifting the top half of the mold with it.

2. A fixture is placed over the lower half of the mold to apply any inserts which are required. These inserts may be forced into place by lowering the tilting head and raising the sub-press ram momentarily.

3. The insert fixture is next removed and a loading fixture is placed over the lower half of the mold to measure the proper quantity of material, in powdered or biscuit form, into each mold cavity. The fixture is then removed and the surface of the mold is brushed free of any excess material.

4. The top half of the mold is lowered into position and the sub-

press ram is advanced to close the mold.

5. The hooks are released and the tilting head is raised.

6. The main ram is lowered, the indexing device is released automatically, and the table is revolved 180 deg. about its vertical axis, bringing the freshly loaded mold to the heating station and also bringing the cured mold to the cooling station.

7. After indexing, the main ram is raised and curing of the fresh mold under pressure begins.

8. Simultaneously, at the cooling station the tilting head is lowered, the sub-press is raised, and the cured mold is cooled.

9. After cooling, the sub-press ram is lowered and a stripping fixture, equipped with suitable knock-out pins, is rolled on a track under the mold.

10. The sub-press ram is again raised and the knock-out pins of the fixture push the molded pieces free, at the same time raising the top half of the mold in contact with the tilting head. The ram is then lowered.

11. The top half of the mold is lifted off by the tilting head and a finger fixture is used to lift the molded pieces from the dies.

12. The whole process is repeated starting with operation 2 above.

The two-station design permits of the heating and cooling connections being kept continuously hot or cold, thus reducing leaks, saving maintenance, and keeping steam and water consumption at a minimum. Where the same channels are used for steam and water controlled by a multi-valve it is difficult to keep the pipe joints tight. Since the die-chases used in this design are not subjected to the sudden excessive temperature variations found when direct heating and cooling are used, the tendency to "grow" and produce shrinkage cracks is lessened. Furthermore, they need not be provided with channels for steam and water and are merely set in place on locating pins without piping connections so that they may be quickly removed. Formerly pipe connections to die-chases had to be removed to change dies and the application of direct heating and cooling to die-chases shortened the life of the dies. It should be noted that two designs of parts may be produced simultaneously on one press without changing dies.

This press, in which the main ram is pushing upwards against a stationary head, retains in the sub-press position all the advantages of a tilting head press, it is claimed, and may be built in very large capacities without becoming unwieldy. Using 150-lb. steam pressure, operating temperatures are reached in 20 minutes, starting with a cold machine.

The control levers are interlocked to prevent false operation, so that the rams cannot be raised or the tilting head lowered unless the revolving table has been indexed to the correct position. All hydraulic valve controls are grouped conveniently at the left of the machine. A timing device, if desired, may be added to indicate completion of the curing period. The tilting head is hydraulically operated, but the hooks are manually operated from a single lever located on the front of the tilting head. Each operation is positive and no counterweights nor gravity returns are used. The revolving table is mounted on roller bearings for quick and easy turning with a minimum of effort. The machine is entirely self-contained and self-supporting, no equipment being located in a sub-floor compartment. Weekly lubrication has been found sufficient.

Westinghouse Dual Drive Welding Unit

Another dual drive arc welding unit has been introduced by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. The unit consists of a standard 300-amp., single-operator, welding generator, a 15-hp., a.c. induction motor and a six-cylinder, 1,800 r.p.m. Model P-45 Continental gas engine, all mounted in tandem on structural steel welded base. The motor operates on 220 volts, but, by reconnecting

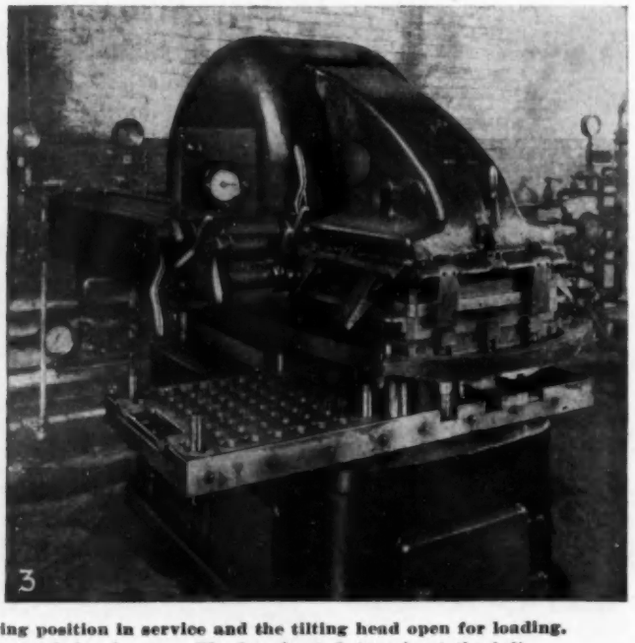
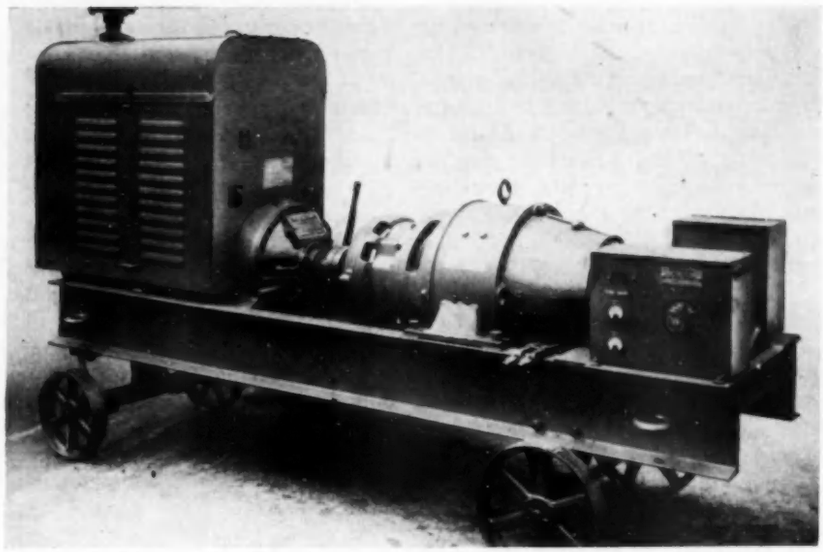


Fig. 2—Busch-Sulzer Hydraulic Molding Press, showing the curing position in service and the tilting head open for loading. Fig. 3—Both the curing and the cooling positions are shown as being in use. The knockout fixture is at the left



Westinghouse Dual Drive Welding Unit

the external motor leads and changing the line-starter coil, it can be used on 440 volts. The welding generator can be driven by either the gasoline engine or the electric motor by simply engaging or disengaging a slipcoupling or clutch, whichever is provided. The dual drive welding machine can be furnished in all the standard single-operator ratings.

Cincinnati No. 2 Cutter Grinder

BOTH plain and universal models of the No. 2 cutter grinder have been placed on the market by the Cincinnati Milling Machine Company, Cincinnati, Ohio. These machines embody several improved features of convenience, accuracy and rigidity. The universal machine consists of a plain unit with a vertical sliding attachment, surface grinding attachment, gear sharpening attachment, and an internal grinding attachment. The universal machine is only supplied with a motor-driven workhead, a ¼-hp. 1,750 r.p.m. motor being used.

The grinder, as illustrated, has a heavily ribbed box type bed with a three-point support on the floor. It also has a large accessible compartment for the self-contained motor. The table is placed at a fixed height and the operating position for all types of cutter grinding is also fixed.

Ease of operation of the table is obtained by mounting it on roller bearing support. The table slide rides on two long roller chains guided by four ball bearings, two on each end. The saddle has accurate cross adjustment up to 10 in. by the use of the handwheel. Means for this same adjustment are supplied at the rear of the machine. The table proper can be swivelled and has a regular graduated swivel dial, a scale reading the taper in inches per foot. It also has means for fine adjustment.

A fine handwheel movement, which is desirable for cylindrical grinding and surface grinding, is obtained by engaging the knurled knob at the center of the circular box at the right-hand side of the machine, and then giving movement to the table by turning the crank. The engagement of this knob prevents table traverse in either direction except by means of the crank. This feature is especially useful as a means for locking the table against end movement when setting up a job. The knurled knob at the rear is used for ordinary cutter grinding. Over-all dimensions of the table are 5¼ by 36 in. and the movement in line with the centers is 18 in. Work 10 in. in diameter can be swung between centers, and the lengths of the work taken are 27 in. between the ends of the table and 21½ in. between the right-hand tailstock and the regular headstock.

Facilities have been provided for attaching the new style tooth rests for any kind of cutter grinding job. Cushioning dogs are bolted to the side of the table. Alignment of the tailstocks and the workhead is secured by drawing them to one side of the T-slot by means of clamps.

The grinding wheel spindle head has both vertical and horizontal movement, the swiveling movement being from zero to 240 deg. Vertical adjustment is made by the use of a handwheel with dial graduated to thousandths, located just under the saddle. The maximum vertical adjustment is 7½ inches.

The drive for the grinding-wheel spindle head is obtained by the use of a special ½-hp., 3,425 r.p.m. motor, mounted at the lower end of the column. The motor shaft and spindle are parallel and the drive is made through a straight belt. Provision is made for taking up belt stretch. A two-step cone pulley arrangement gives two grinding wheel speeds of 3,850 and 5,735 r.p.m. The grinding wheel spindle is ball bearing mounted and the grinding wheels are fitted on collets.

The grinding wheel spindle bearings are lubricated by oil from a reservoir located on the back of the head. The saddle itself forms an oil reservoir in which the roller chains, upon which the table slides, are

Cincinnati No. 2 Cutter Grinder

immersed. Wicks carry oil from the same reservoir to the two V bearings at the saddle. Centralized oiling is provided for the column elevating mechanism.

A large workhead receives the

shanks of end mills and face mills, holding them for sharpening in just the same position as if they were held in the nose of the milling machine spindle. The head swivels in the vertical and horizontal planes, both movements being measurable in degrees. The patented clearance setting dial has been retained for getting a direct and positive setting for any clearance angle required. A National standard taper hole is supplied on one end of the spindle and a No. 12 B&S taper hole at the other. Four taper collets are supplied for reducing the No. 12 B&S taper hole to a No. 11, No. 10, No. 9 and No. 7 for holding other size face mills up to 12 in. in diameter, formed cutters (using 6-in. diam. wheels) up to 5½ in. in diameter, and faces of teeth.

The cylindrical grinding attachment supplied takes 21½ in. between centers and will grind a section 12¾ in. in width in one setting. Holes 3 in. deep and $\frac{9}{16}$ in. in diameter and larger can be ground by using the internal grinding attachment. The gear sharpening attachment grinds straight and staggered teeth uniform and radially on gears up to 8½ in. in diameter. Work 4 in. wide can be ground with a surface grinding attachment with an extension, having vise jaws 4 in. wide, $\frac{3}{16}$ in. deep, and opening 2½ inches.

Four grinding wheels, one each of the regular straight, straight cup, flaring cup, and dish type are supplied with the machine, whereas the universal machine is supplied with these and also one additional straight wheel and one wheel for the internal grinding attachment.

The floor space required for both the plain and the universal machines is 4 ft. 10 in. by 5 ft. 10½ in. The plain machine weighs 1,600 lb., while the universal machine weighs 1,750 pounds.

Braun Model SRB Radial Drilling and Tapping Machines

SIMPLICITY of the saddles, centralized controls, and ease of adjustment are the principal features of the Braun Model SRB radial drilling and tapping machines recently introduced into the United States by the United Machine Tool Corporation, 75 West St., New York, N. Y. High operating efficiency is obtained by mounting the motor on the top of the saddle whence the flow of power is as short as possible, and by using ball bearings in the gearbox. The machines are manufactured in Germany by Franz Braun, A.G., Zerbst.

The Braun column is made in two pieces, an inner and outer column. The inner column is cast in one piece with a foot of large diameter. On this inner column the outer column with the arm swings a full 360 deg. The diameter of the outer column of Model SRB-60 is 20 inches. To insure easy movement, the upper portion of the outer column is fitted with radial and thrust ball bearings, and the lower portion is supported on two adjustable rollers running on ball bearings. Provision to calibrate lateral error is made by a knurled nut. A column binder of large diameter operated by hand lever serves for clamping the outer to the inner column, and an electrically controlled clamping device can be furnished.

The arm is a substantial box casting of bow construction, and, in addition, it is strongly reinforced by ribs. Its construction permits the minimum distance of the spindle to the supporting raceway, which is a chilled surface. The arm sleeve surrounds the column. Its vertical adjustment is effected by a screw driven by an auxiliary motor. Limit switches are provided as well as levers for clamping it in any position.

The saddle or head is made in two sizes. It traverses along the arm by a handwheel located on the same shaft as the double-ended lever controlling the quick vertical adjustment of the spindle. Thus, the two most important means of control are located one behind the other. The design of the saddle and the provision of adjustable rollers running on ball bearings insure easy movement and a quick adjustment of the drill. The spindle is counterbalanced.

Spindle Construction

Roller bearings, ball bearings, and plain bronze bearings are used on the drill spindle which has six splines. All shafts in the gearbox are six splined as well and they run on Timken bearings on top and in a double radial ball bearing and one thrust ball bearing at the bottom. Gears are made of nickel-chrome steel throughout, are heat-treated, and have chamfered and ground flanks. The whole gearbox is oil immersed. The spindle on Model SRB-60 is fitted with a No. 5 Morse taper and has a vertical traverse of 15¾ in. The minimum spindle diameter is 2⅜ in., whereas the largest is 3½ inches.

The machines are designed for the use of high-speed steel drills. The capacity of the spindle is designed for drilling 2⅜ in. at high speed and 3⅜ in. at reduced speed in machinery steel, tapping 2½ in. in cast iron, 2 in. in steel (Whitworth Thread), and boring to 7⅞ in. With suitable back gearing these capacities can be increased.

There are three means provided

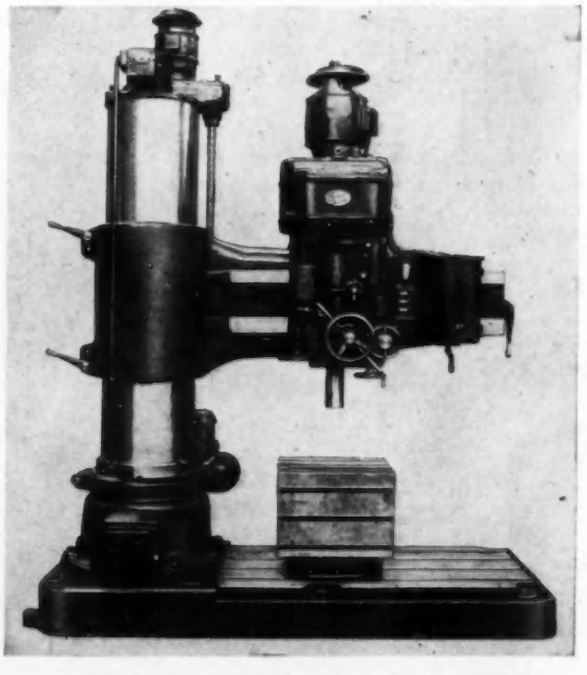


Fig. 1—Braun Model SRB-60 Radial Drilling and Tapping Machine of which the features are centralized controls, simplicity of the saddle, and ease of adjustment

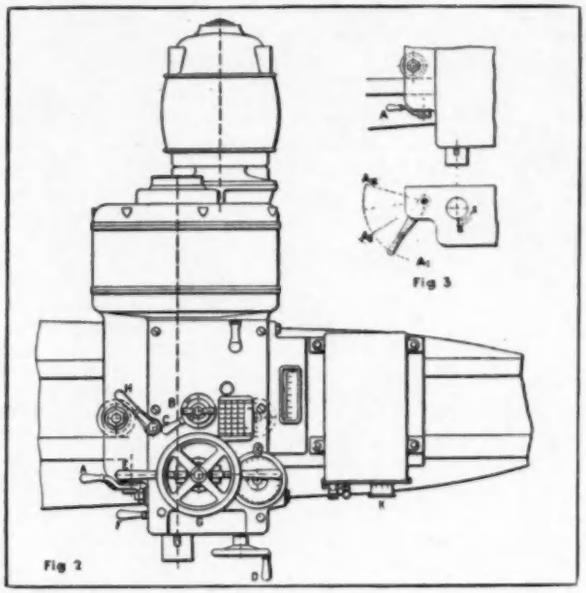


Fig. 2—Sketch of the saddle mechanisms. All mechanically controlled speeds are secured by moving lever *A*. Each of these speeds may be modified in many steps by the d.c. speed controller *K*. Fig. 3—Diagram of how the mechanical speed changes are made with lever *A*

for control of the feeds: Two manual and one automatic or power feed, the double-ended lever for rapid control, the small handwheel for accurate spotting, and the power lever for adjusting or changing the automatic feed. The automatic feed of the spindle is by spur gears, worm, rack, and pinion. The double-ended lever, mentioned above, as controlling the quick vertical movement of the spindle, also puts the feed clutch in and out of action. Since this clutch is positive, any slip in the feed gear is prevented. A safety clutch is used to prevent overloading. The range of the eight feeds per revolution of the spindle is from 0.0039 to 0.0315 inches.

The vertical motor drive as installed on the head gives a large number of spindle speeds with very close increments, coupled with centralized control on head or saddle. The Model SRB-60 is equipped ordinarily with a 10-hp. d.c. motor.

The gearbox contains three backgears controlled by a single hand lever *A*, see Fig. 2, operating two friction clutches and a dog clutch, thus giving three mechanically controlled speeds. These speeds are so arranged that successive steps have automatically opposite directions of revolution. However, when operating the lever *A* in Fig. 2, the spindle only is reversed, while all other driving members, including the motor, are kept running in the same direction so that no momentum has to be overcome. In reversing the motor, all speeds may be used right and left hand. The mechanically controlled speeds are subdivided by the electric speed controller into either 11, 20, or 25 further steps per mechanical speed, giving a total of 33, 60, or 75 spindle speeds, respectively. For this purpose the controller is provided with a graduated controller drum *K* and a no-volt and overload release, permitting the operator to pre-adjust the required spindle speed before switching on the current.

In cases where a.c. current is available, two types of vertical motors may be used; either a pole-changing motor giving two electrically controlled speeds or a constant-speed motor. In the first instance a total of six spindle speeds is available with the use of three backgears, but with a constant-speed motor the three speeds obtained through the backgears are increased to nine spindle speeds by inserting a second row of backgears.

Bonney Chrome-Vanadium Double-Hexagon Sockets and Wrenches

Chrome-vanadium steel is used for the sockets and short, double-hexagon box wrenches announced by the Bonney Forge & Tool Works, Allentown, Pa. Because of the great strength of this alloy, it has been possible to design the sockets with very thin walls. The wrenches are broached with double hexagon openings, making it possible to remove nuts or bolts even though obstructions will permit only a one-twelfth turn at a setting.

Fig. 1—Bonney Chrome-Vanadium Double Hexagon Socket

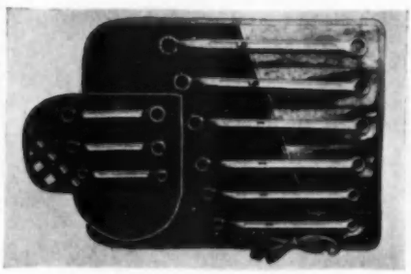


Fig. 2—Set of Bonney Double-Hexagon Box Wrenches

The wrenches are put up in two sets, the No. 29 consisting of three sizes, taking care of the six most commonly used nuts, and No. 31 set consisting of six wrenches, also for commonly used nut sizes.

Clark No. 000 U "Wonder" ¼-Inch Electric Drill

A ¼-in. drill that is suitable for work in close quarters has been placed on the market by the James Clark, Jr., Electric Company, 600 Berman St., Louisville, Ky. The drill is only 7½ in. in length and it has a no load speed of 2,000 r.p.m. and a loaded speed of 1,200 r.p.m. Ball bearings are used throughout. In tests it was found that the drill could not be stalled even when a 200-lb. man was operating it. If the bit was properly sharpened it would continue

Clark No. 000 U "Wonder ¼-Inch Electric Drill

to cut, but if it were not properly sharpened the drill would simply revolve on the material. The drill weighs only 4½ pounds.

"Standard" Combination Grinder

A combination grinder with a ring-wheel chuck on one end and an emery wheel on the other end is being manufactured by the Standard Electrical Tool Company, 1938-46 West 8th St., Cincinnati, Ohio. This grinder is an addition to the standard line of the company. Ball bearings are S.K.F. ball bearings, and there is also a ball thrust bearing to take the end thrust of the ring-wheel chuck. The machine in the illustration is equipped with a 5-hp. G.E. 40-deg. motor. It is made in 2-, 3-, 5-, and 7½-hp. sizes.

Standard Combination Grinder

REVIEW · OF · RECENT · PATENTS

Relating to the Machinery and Metal Products Industries

Metal Working Machinery

To the New Process Multi-Casting Co. has been assigned patent 1,725,839 on a mold-making machine combining a rotatable flask, means for moving it upward, a squeeze head above the flask and other co-operating parts.

A molding machine, comprising a vertically movable rotatable flask, a swingable table and pattern plate, means for drawing the pattern and other parts, is covered by patent 1,725,840, assigned to the New Process Multi-Casting Company.

Patent 1,725,892, assigned to the Wyman-Gordon Co., relates to a testing machine with quick-clamping jaws automatically and yieldably movable, to hold test bars.

The Brown Metal and Cork Co. is assignee of patent 1,725,984, covering a casting machine having a mold-forming member mounted on a track, a matrix with a gate, a blade-like draw core for grooving the casting, and other co-operating parts.

To the New Process Multi-Casting Co. has been assigned patent 1,726,022 relating to a molding machine with a table jarred by a piston and cylinder mechanism which is controlled by a hydralically actuated valve. Other molding machine patents assigned to the same company include: No. 1,726,023, covering the combination of a flask-handling and pattern-drawing mechanism, means for rotating and elevating same, an expansion chamber, and other parts in novel arrangement; No. 1,726,024, relating to the combination of jarring table, a piston and cylinder one of which carries a flask and pattern plate, a fixed squeeze head, and other parts; and No. 1,726,025, covering the combination of a two-part flask with a counterbalanced carrying means, and means for drawing a pattern from both parts of the flask.

Processes

Joseph J. Moscuch of East Orange, N. J., has been granted patent 1,728,622 on a method of producing polished articles from rolled bars, by grinding the straight bar, heating and bending same, and thereafter tempering and polishing.

A method of coating sleeve valves with sprayed molten metal to form annular deposits over spaced portions thereof, is the subject of patent 1,727,302, assigned to the Willys-Overland Company.

TRADE PUBLICATIONS

HEATERS, AIR, GAS-FIRED. The Gehnrich Oven Co., Inc., Long Island City, N. Y., has published a bulletin on its industrial air heaters of the indirect gas-fired type for air drying paint and varnish finishes, and other drying processes requiring temperatures up to 250 deg. F. The bulletin gives the specifications of the various units.

GENERAL ELECTRIC PUBLICATIONS. The General Electric Co., Schenectady, N. Y., has published a series of bulletins as follows: No. GEA-556C, superseding 556B, on an automatic welding head and control; No. GEA-569C, superseding 569B, on constant-potential arc-welding sets; and No. GEA-1174A, on the Type RRT mesh-belt conveyor furnace for quantity heat-treatment of various small parts.

LATHES, BRAKE-DRUM. The South Bend Lathe Works, 426 E. Madison St., South Bend, Ind., has pubished bulletin No. 29, on its brake drum lathe. In addition to explaining its uses and advantages for wheel and brake drum servicing, the catalog illustrates uses of the lathe for general-purpose replacement and repair machine work. It describes and prices all models and shows various tools.

RIVETING MACHINES. The United Machine Tool Corporation, 75 West St., New York, N. Y., has published a bulletin on "Elemge" self-contained electro-mechanical toggle lever riveting machines, and self-contained electro-hydraulic riveting machines. The principles of construction are described and various types are illustrated, together with special riveting tools. Specifications are listed. The catalog contains 24, 11x8½-in. pages.

SCREW THREAD TABLES. The U. S. Department of Commerce, Bureau of Standards, has published Bulletin No. 99 on "American National Screw Thread Tables for Shop Use — II Special Threads," which is a recommended commercial standard. The publication presents in compact form the tables and dimensions of special screw threads, the American National form of thread (60 deg.), and covers the basic sizes, limiting dimensions, and tolerances for the American National 12-pitch thread series and other screw threads of special diameter in thickness and length of engagement.

TAPS, METHODS AND DEVICES FOR MEASURING ODD-FLUTED TYPES. The National Screw Thread Commission, Bureau of Standards, Washington, D. C., has published circular No. 143 on "Methods and Devices for Measuring Odd-Fluted Taps," which takes up special micrometers, the Zeiss universal measuring microscope and dividing center, the single-wire method with top mounted between the centers, the Jones & Lamson "Hartometer" thread gage, and the Wells thread gage. These various methods are presented in chronological order of their development and no attempt is made to compare their relative merits. The bulletin contains eleven 11x8½-in. mimeographed pages.

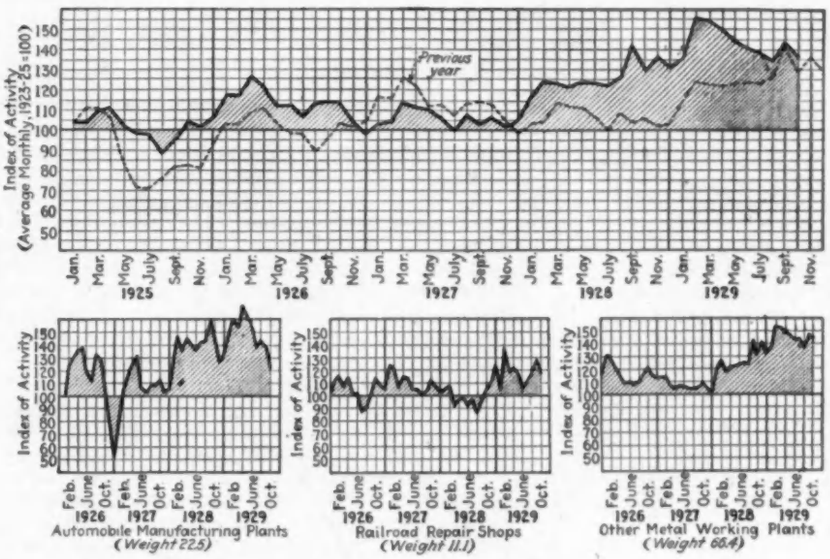
NEWS
OF THE WEEK

Metal-Working Industry Is More Active Than at Peak of Activity Last Year

By R. M. Davis

Statistical Editor, McGraw-Hill Publishing Company

THE volume of operations in the metal-working industry during October was still above that of last year, in spite of a decrease as compared with September. The volume is indicated by data received by *Electrical World* on the consumption of electrical energy by a large number of these plants scattered throughout the country. The October rate of activity in the metal-working industry, after corrections are made for the number of working days, was 4.5 per cent less than that of September, but was 6 per cent greater than that of October last year. The remaining two months of the year probably will show a slowly decreasing rate of activity in line with such a trend in other lines of industry.


Index of Activity (Average Monthly, 1923-25=100)
Previous year
Jan. Mar. May July Sept. Nov.
1925 1926 1927 1928 1929
Index of Activity
Feb. June Oct.
1926 1927 1928 1929
Automobile Manufacturing Plants (Weight 22.5)
Railroad Repair Shops (Weight 11.1)
Other Metal Working Plants (Weight 66.4)

The automobile manufacturing industry, including the manufacturers of parts and accessories, reported a decrease in the rate of operations during October of 11.4 per cent as compared with the rate in September. Current October operations were about 13.3 per cent less than those of the same month last year. The automobile industry will probably continue to decrease its rate of operations during the remaining months of the year.

Other branches of the metal-working industry present a more favorable picture. The October rate of operations outside the automobile plants and railroad repair shops was 2.7 per cent less than that of September, but was 0.3 per cent greater than that of October last year. October was the peak month of 1928, so that the mere fact of current months having exceeded this peak is most encouraging, particularly at this time of the year.

Activity in the railroad repair shops during October was 8.6 per cent below that of September, but was 11.3 per cent greater than that of October last year.

* * *

Westcott Chuck Company Announces Appointments

The Westcott Chuck Co., Oneida, N. Y., has appointed G. L. Hunt, Philadelphia Bourse Bldg., Philadelphia, as its representative in that territory, which includes eastern Pennsylvania, Maryland, Delaware, and southern New Jersey. The Noxsel-Stroman Co., 14 E. Trupper St., Buffalo, N. Y., was also recently appointed representative in the Buffalo district, S. A. Dinsmore, 327 S. LaSalle St., Chicago, in the Chicago district, and F. A. O'Donnell, 1509 First National Bank Bldg., Pittsburgh, in the Pittsburgh district. The K. D. Carlson Co., Box 397, Arcade Station, Los Angeles, and 268 Market St., San Francisco, has been appointed for the San Francisco and Los Angeles districts. Warehouse stocks are maintained at 560 West Washington St., Chicago, and the South End Warehouse Co., San Francisco.

* * *

THE Steel Founders' Society of America is planning a regular meeting at Cleveland at the time of the American Foundrymen's Association Convention there during the week of May 12. John E. Galvin, vice-president of the Ohio Steel Foundry Co., will direct the meeting.

* * * *

French Metal-Trade Exports Fall Off But Local Consumption Increases

By Our Paris Correspondent

EXCEPT for the generally recognized falling off in French exports in many lines of the fabricated metal trades, there is little evidence of a slowing down of productive activities. At all events, it has not led to unemployment, as it is precisely in the metal-transforming trades that labor shortage is most pronounced. Capital expenditure and assured market for increased production are the chief features of the situation which may be accepted as an explanation.

The second congress organized by the Bureau International de Normalization de l'Automobile was held in October. Twenty-odd questions affecting the international standardization of automobile elements and accessories were discussed. It is anticipated that standard units and elements, and in many cases standardized methods of production, will result.

Some relatively "big things" are in prospect in the automobile industry and, willingly or unwillingly, acknowledgment is made to the part which American machinery, upon which so much of

the French output in this line is dependent, is likely to play therein.

The latest to line up publicly on this issue is the Mathis firm, which makes a light car in three current models. Monsieur Mathis himself has stated that he is perhaps the one in the French industry who has most observed close-up American manufacturing methods by frequent visits. The results of such observation are self-evident in the equipment of the main plant at Strasbourg and the Gennevilliers *atelier* in suburban Paris in American machine tools. "Mathis, with his great experience," says Charles Faroux, the best-known engineering authority of the industry, "knows and appreciates the methods by which American cars are produced." The firm has expended 50 million francs in new installations and equipment during the past few months and is the first in Europe to have adopted the "hypoid" gear.

The annual automobile show just closed in Paris at the Grand Palais may well be referred to as a Franco-American exhibition. There were thirty odd American cars shown and fifty French *marques*. This has suggested to French economists that French manufacturers must look to their production costs more than ever if this competition is to be met successfully.

First six months imports of machinery and parts from the United States increased to the value of 295,072,000 francs in 1929, from 171,205,000 francs in 1928. This was an increase of 73 per cent. In bulk they increased from 6,724 metric tons to 13,133 metric tons. The value per ton was approximately $900 in 1929 and $1,015 in 1928. The inference is either that lower-priced units were being bought or that prices themselves were brought to a lower level to meet those of local competition or more likely that from Germany in this market. The answer is more likely the latter. The influence of British machinery for metal working in its most approved methods is a lesser factor in this market.

Automobile export from France, which two years ago approached 40 per cent of the total output, but which has fallen off since, appears to be picking up again but has not reached the former proportions. Monsieur Citroen has pointed out the fact that French exports in this line exceeded imports five to one. It is a curious comment, nevertheless, that these exports were chiefly by the two big production plants here while those imported were from the two big producing units of the United States. Aside from the American product, the chief automobile imports come from Italy, a few from Germany and Belgium, and fewer still from Great Britain. Those brought in from the United States during the first six months showed an increase of 142 per cent over the number of the year before.

Total imports of the first eight months of the present year exceeded those of the same period in 1928 by 4½ billion francs. The increase was nearly a billion francs from the United States, three hundred million from Great Britain, and eight hundred million from Germany. The export total fell off 2¾ billion francs; that to the United States, however, increasing by nearly a hundred million francs. There was a decrease to Great Britain and to Germany.

* * *

THE American Foundrymen's Association will hold its annual convention in Cleveland, Ohio, from May 12 to 16, 1930. A non-ferrous shop operation course for brass foundrymen will be included in the program.

S.A.E. Holds 4-Day Transportation Meeting

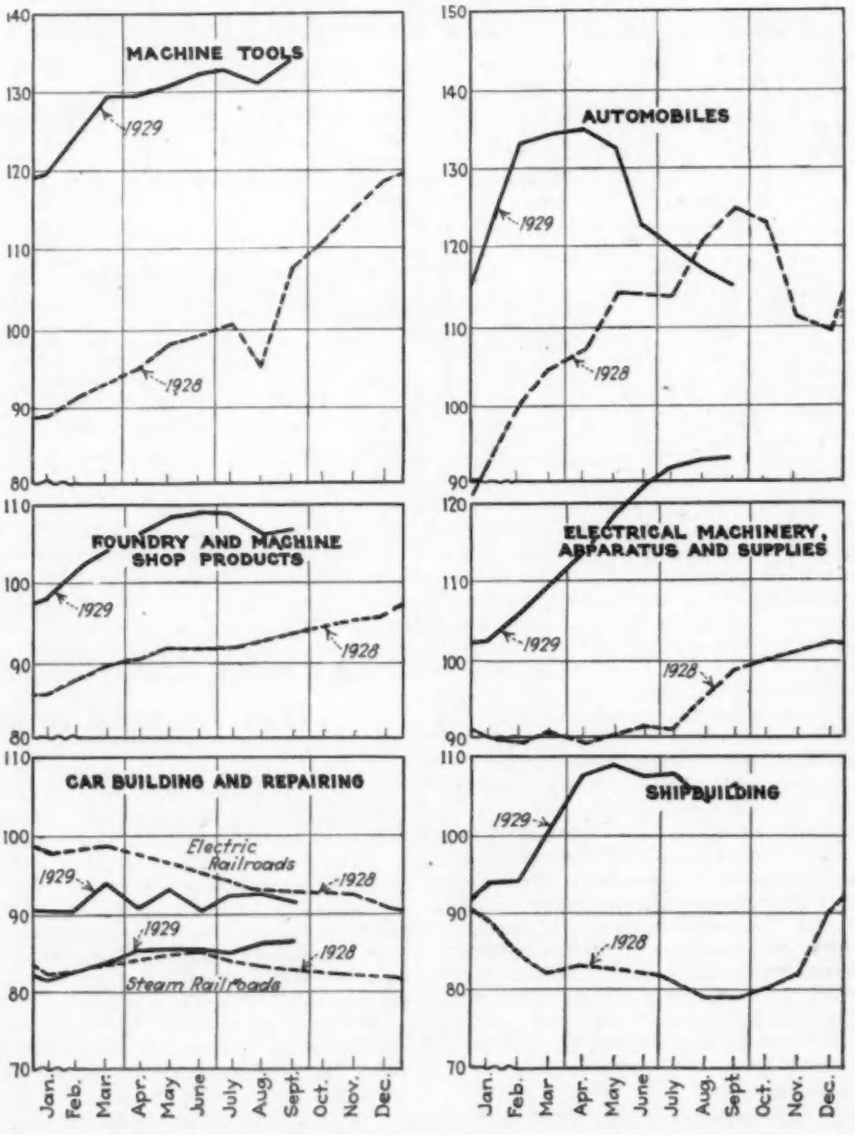
The Society of Automotive Engineers held its 4-day transportation meeting beginning on Nov. 12 at the Royal York Hotel, Toronto, Ont., with many prominent engineers and transportation executives from all parts of the United States and Canada in attendance. Papers on the trends of motor-coach design, body construction, the structure of six-wheeled vehicles, and uses of motor trucks and buses in connection with the railroads were presented. The get-together dinner was held on Thursday, Nov. 14, at the Royal York Hotel.

* * * *

Trend of Employment in the Metal-Working Industries

Data Supplied by the Bureau of Labor Statistics

Monthly average for 1926 = 100



Gas Welders Hold Convention in Chicago

The International Acetylene Association held its 13th annual convention in Chicago at the Congress Hotel from Nov. 13 to 15. Material dealing with the various phases of gas welding was presented to 344 engineers and executives. A feature was the report of the oxy-acetylene committee which presented a bird's-eye view of the industry, outlining its technical advances and its application expansion.

Technical sessions were devoted to specific branches. For example, there was a session dealing with gas welding in the aircraft industry, a testing session outlining the attitude of authorities toward the welding of boilers, pressure vessels, and steam lines, and a discussion of the methods of testing. There was also a chemical session outlining some recent uses of the oxy-acetylene process in the chemical industry with a second paper dealing with the welding of copper; a structural steel session; a welded piping session, and the presentation of several papers going into safe welding practice and fire losses attributable to the careless use of the blow pipe. At the final session there were papers dealing with the application of the automatic cutting machine to welded steel products and oxy-acetylene welding in the manufacture of pumps.

New officers elected for the coming year were: President, C. A. McCune, director of research, American Chain Co.; vice-president, W. E. Flannery, of K-G Welding and Cutting Co., Inc.; secretary and treasurer, A. Cressy Morrison, of the Union Carbon & Carbide Corporation, New York City.

* * * *

Machinery and Equipment Associations Discuss Depreciation at Meeting

THE Fourth Conference of Machinery & Equipment Associations was held Nov. 11, at the Chamber of Commerce of the United States, Washington, D. C., twelve national associations being represented. Under the chairmanship of E. F. Du Brul, general manager of the National Machine Tool Builders Association, the meeting discussed the attitude of the U. S. Treasury Department toward depreciation, the proposed import prohibition of foreign-made goods bearing American-owned registered trade marks, and trade with Russia through Amtorg.

Since it has been reported that the Treasury Department was rejecting the co-operation of trade associations in its determination of basic industrial depreciation rates for income tax purposes and was about to issue mandatory rates of its own, the Conference requested the presence of a department representative competent to discuss the problem. John T. Keenan, engineer of the Department of Internal Revenue, assured the meeting that the Treasury Department had been compelled, by lack of time, to go forward with the depreciation study on its own. Members of many associations could not themselves agree on rates and some associations refused co-operation. In order, therefore, to get the rates prepared for use this coming March, direct action was taken.

Mr. Keenan advised all manufacturers to remember that these depreciation rates are guiding rates and are not mandatory. Returns are to be prepared according to the facts. A resolution favoring the co-operation of Industrial Associations in the study of depreciation rates was addressed to the Commissioner of Internal Revenue.

The proposed Senate import prohibition of foreign-made goods bearing American-owned, registered trade-marks became the subject of active round-table discussion. Since the proposal was found to be aimed particularly at Mr. Ford's Irish tractor plant and since it would work undue hardship on merchant importers, a resolution was adopted recommending that all trade associations support the report of The Merchants Association of New York.

The highly explosive subject of trade with Russia through the Amtorg Trading Corporation provoked warm discussion, the consensus being that the U. S. Department of Commerce should be consulted by any manufacturer or trader before signing any agreements or contracts. It was pointed out that the two most widely advertised contracts are protected by special guarantees and that copies can be seen on file at the Department.

The next meeting of the Conference will be held Monday, Feb. 3, 1930, in Washington.

* * *

Railroads Increase Freight Hauled During Nine Months

The volume of freight traffic handled by Class 1 railroads for the first nine months of 1929 was 369,601,678,000 net ton miles according to reports for that period just received by the Bureau of Railway Economics. This is an increase of 20,283,895,000 net ton miles, or 5.8 per cent greater than that during the same period of last year and an increase of 12,285,490,000 net ton miles, or 3.4 per cent greater than that during the same period in 1927.

The net operating income during the same period was $960,078,699, which is at the annual rate of return of 5.29 per cent on the property investment. In the first nine months of last year, the net railway operating income was $820,572,952, or 4.59 per cent on the property investment.

National Founders Ass'n Meets in New York

Meeting at the Hotel Astor in New York City, the 33rd annual convention of the National Founders Association began on Nov. 20, and closed on Nov. 21. Reports of officers and committees opened the meeting, and the afternoon was given over to a session on finance and improvement. Control and selling were taken up at the Thursday sessions. An alumni dinner was held on Tuesday evening, Nov. 19, and the regular convention dinner the following evening.

* * *

Depreciation Standards To Be Set By U. S. Treasury

BY OUR WASHINGTON CORRESPONDENT

Depreciation accounting practice varies greatly in individual plants. Properly manipulated, the depreciation account may be used to convert loss into profit and profit into loss, depending on whether the report is for stockholders or for Uncle Sam. Next January or thereabouts, the Bureau of Internal Revenue will issue a bulletin setting forth schedules of depreciation rates for many industries. It will bring down a storm of protest and the Bureau will feel that success at last has crowned its efforts to direct the attention of industry to this problem. For years the Bureau has been wrestling with allowances claimed for depreciation. Three years ago the Bureau sought the co-operation of trade associations in setting up basic rates of depreciation for their respective industries but the majority either ignored or resisted the Bureau's overtures.

Finally, the Bureau decided to go out and do the work itself. Its engineers have visited a selected number of plants representative of their industries. Data were obtained from plant engineers and from property accounts. The rates computed thereon will not be binding and no attemp twill be made to apply them arbitrarily in auditing the tax returns of individual plants. Admittedly only something to shoot at, no harm will be done, in the Bureau's opinion, if the rates tentatively arrived at are awry. Criticism and suggestion will be invited to the end that basic rates of depreciation under normal conditions may be determined. The bulletin may run through two or three revised editions before this goal is reached.

* * *

German Executives Visit American Plants

Dr. Egon Loewe, managing director, and K. Hegner, technical director, of Ludw. Loewe & Co., Berlin, Germany, are visiting prominent machine builders in this country. They were guests at the National Machine Tool Buliders' Exposition and are now visiting various industrial plants in New England and other sections of the country. They will return to Germany about Dec. 15.

BUSINESS BAROMETER

Reduction in Broker's Loans, Better Rates on Money, Tax Cuts and the Industrial Conference Are the Bright Spots

By THEODORE H. PRICE
Editor, Commerce and Finance, New York

THE skylight view of the stock market decline would show that it has not diminished the wealth of the country by a single penny. The properties represented by the stocks that have been bought and sold are unimpaired in efficiency. In the last analysis their earning power has not suffered, and the so-called decline is nothing but a deflation that reflects the contraction of speculation.

It is the losses of speculators, and their losses only, that have been used as the basis for the depressing news and rumors that were so widely circulated last week. That business will soon commence to feel the benefits that will follow the collapse of the speculative bubble, there can be no doubt.

That there are some timid souls who have been made bold by the decline is evidenced in the number of odd-lot purchases that are being made on the New York Stock Exchange, and the amount of money that has been thus invested during the past two weeks must have been enormous. Most of the stocks bought will be put away, and they are not likely to be for sale until the country again goes crazy over its future and the enthusiasts of a decade hence try to discount economic conditions as they will be in 1950.

Most commodities, including grain, cotton, rubber, hides, wool, silk, coffee and sugar, show more or less decline. These declines are in every instance attributed to the weakness of the Stock Exchange. Sight is lost of the artificial situation that has been created in coffee by the interference of the Brazilian government with the law of supply and demand, and in their eagerness to blame the decline on the stock market, news-gatherers have entirely ignored the fact that cotton and grain are in a bearish statistical situation that might have carried them lower if it were not that the Federal Farm Board has indicated that it is willing to lend the approximate equivalent of present values to the co-operative marketing associations of the grain and cotton states.

Rubber is lower in anticipation of a seasonal slump in the demand for tires, coupled with unexpectedly large production. Silk reflects the liquidation of the Japanese accumulation that had been acquired in the hope of higher prices. Sugar is depressed by the weight of stocks that will have to be carried over into the next crop year.

From this page the reader will get a quick picture of current business and industry. The boxed material below is a summary of the letters from regional correspondents of the American Machinist, published in full on the opposite page.

NO CHANGE of any proportions has occurred in the machinery and machine-tool business during the past week. Most centers reported that the stock market difficulties have not affected business to any appreciable extent, and the year is expected to be better than for some years past. Deliveries are improving slightly in most cases. Prices remain unchanged, with no indication of a tendency to change in the near future. Inquiries are being received in good volume, in some instances in increasing volume.

CHICAGO reports an upward trend in inquiries, with activity in the radio industries picking up. New England activity is moderate, with production regular and demand good. Milwaukee dealers are confident of increased business in the future, with a considerable amount of business pending. Cincinnati inquiries are increasing, and orders are good. The New York market is little changed, with export demand increasing and the used-tool market slowing up. The Philadelphia market is spotty, with the level of business at a fairly high mark. Cleveland railroads and steel mill buyers featured the market in that district, with one big order for automobile frames. Detroit demand is slow, but dealers are anticipating better conditions after the first of the year adjustment of the general situation.

So the stock market is not altogether responsible for the decline in commodities. It is true that there has been some slackening in the demand for expensive luxuries. Fur coats, jewelry, and expensive cosmetics are said to be slow of sale. High-priced automobiles are also a little difficult to dispose of, and radio sets can be bought at a substantial concession.

Because the accumulated supplies of staples are small there is no general price-cutting, and there is no demoralization in the retail trade. The Christmas stocks are full, but the department store proprietors were cautious, and but few of them seem to be over-supplied.

Among the textile jobbers, lower prices for staple goods are generally expected. This expectation is, however, based upon the decline in raw cotton and raw wool rather than upon any intrinsic weakness in the position of the manufacturers or the distributing trade.

The automobile industry is moving very slowly and is buying little steel, which has caused further curtailment in the latter industry. But buying from its other customers is up to expectations.

As the week closes, the tone of the Stock Exchange shows a distinct improvement. A further reduction of $710,000,000 in brokers' loans makes the total decline in that item about two and a half billions in three weeks, and obviously it is improbable that liquidation will continue at this amazing speed. The New York rediscount rate has been cut to 4½ per cent and many predict still easier money after the holidays. None of the alarming rumors that have been current have been realized, and it looks as if the hysteria that has taken possession of so many is gradually exhausting itself. When it has spent itself and people settle down to normalcy again a distinct improvement in business ought to be noticeable, as nothing that has occurred has in any way reduced the resources of America or the earning power of its people. We have simply been upon an economic spree.

The news from abroad is without special significance. The ceremonies with which Armistice Day was celebrated on both sides of the Atlantic bespeak a further advance in the cause of peace, and President Hoover's proposal that starvation should be abandoned as a war measure is attracting wide attention. Little else in the dispatches is likely to be of interest to American business men. As the capital released by stock liquidation becomes redistributed it will resume its flow through the fields of commerce and industry throughout the world. The result ought to be increased production at a lessened cost instead of the fiscal drought lately occasioned by the diversion of funds to the unproductive business of stock speculation.

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THE INDUSTRIAL REVIEW

Weekly progress of the machinery and machine-tool business

THE following reports, gathered from the various machinery and machine-tool centers of the country, indicate the trend of business in these industries and what may be expected from the future:

NEW ENGLAND

Activity in the New England machine-tool market is moderate. The industry seems to have adopted a policy of watchful waiting from the buying angle. Promised deliveries on most machines are no better, in fact inquiries have been recalled because delivery was so much deferred.

The situation in New England industrial centers is, however, well balanced. Nearly every type of machine has been in good demand and production is regular. Machinery builders are sold in some instances as far ahead as April. This wide-spread demand is still fairly satisfactory and typical of New England business; and while it is unreasonable to look to a period of spirited buying at this late day, the breadth of demand is healthy and characteristic of best progress.

Milling machines, drills, grinders, and lathes were featured in the week's buying and top the demand in this territory. Buyers are deliberate and purchases were chiefly for replacement units. The inventory period is approaching and a further tapering off in the volume of new orders placed from now until the first of the year is anticipated.

MILWAUKEE

Not a single cancellation of an order for machine tools can be traced at this time in this territory to the decline in the stock market, nor is there an instance reported of retrenchment in factory expansion programs previously announced by any industry. Neither have delays in delivery been sought, but on the contrary it is stated that the prevailing condition as to deliveries has induced a feeling among customers that whatever depression might be possible will be ended before deliveries could, in fact, be made. Engineers are going ahead with plans for many hundreds of acres of new factory space locally, work on which is to go ahead early in the spring.

Machine-tool manufacturers expect that easier borrowing conditions and lower rates of interest will stimulate greatly needed and justifiable expansion of small plants. "Buildings are needed to house new machinery, and, with money back in normal channels, building will be resumed," one local manufacturer of machine tools states.

The only buyers reported to be at all timid are a few of the small ones, and they have merely expressed a desire to wait "to see what will happen." There has been no decrease in the volume of pending business and only to a small degree in the volume of inquiries, which latter situation is attributed mainly to the drop in automobile production, approach of inventory time, and seasonal influences. A great amount of pending business remains to be closed with manufacturers of agricultural implements, tractors, excavating and dirt-moving equipment, wood-working machinery, and a long list of metal specialty shops. Dealers are anticipating some delays in these different fields but sssm confident that extra efforts on the part of salesmen will result in orders from practically all of the prospects.

CLEVELAND

Railroads and steel mills were active in the machinery and machine-tool market in Cleveland during the past week. The N. Y. C. & St. L. Railroad is also understood to be preparing a list. Automobile builders are pursuing a policy of watchful waiting until after the forthcoming automobile show, but the Midland Steel Products Co. has just closed a contract for an order of $1,750,000 for automobile frame for 1930. Work on tools for the order has been started.

Employment in the metal-working industries fell off approximately 3 per cent. Some night shifts are being cut out. Inquiries show a slight recession, and demand, exclusive of the industries mentioned above, is not as active as it has been. Business conditions are little affected, and considerable optimism is being expressed for the future.

CINCINNATI

Business of the machine-tool manufacturers of the Cincinnati district remained at a fairly-good level the past week, and while there was a slight falling off of sales in some cases there was nothing to indicate that a general market recession is about to take place. The fact that inquiries are flowing in freely from all sections of the country is taken to be an indication that a livelier market is developing.

Some of the manufacturers of turret lathes have announced an advance in prices, but at this time, it is stated, no steps have been taken to readjust prices by makers of other types of tools.

The past week's business was largely sustained by the purchases of miscellaneous small users, located in all industrial sections of the country, whose requirements were to a very great extent confined to single tools and replacements. Inquiries flowed in freely during the week from all parts of the country, and in some cases more were received than in the previous week. The major portion of the inquiries were from small users, whose requirements were single tools.

Selling agents report that the demand from local and adjacent territory was very good, with very little change from the week preceding.

NEW YORK

No great change has occurred in the machinery and machine-tool business in the New York district during the past week. Demand is holding up well, with purchases still of single items in the main, for a wide variety of industries. There is an increasing demand for machinery and tools for export, Amtorg leading the buying in this field. Sales to Amtorg are made by manufacturers directly, so that this buying has little effect on the New York market.

Several of the larger dealers report an unusually good month for this time of the year, some of them reporting the month's business as good or better than last month's so far. Demand is expected to fall off at this time of the year as a result of the exhausting of budgets of the larger companies. The General Electric Co. has done just that, and there is little hope of any major orders from G. E. until after the first of the year. Several big orders are reported from the Philadelphia district also.

Inquiries are good, in some cases better than they were last month. The New York Central Railway has an inquiry out for lathes. Deliveries are getter better, and as a result, there is a slowing up in the used-tool market. Prices are unchanged, and there is little expectation of a change either way. Business seems to be favoring the larger dealers selling standard lines. The stock market difficulties seem to have left the machine-tool market unaffected.

PHILADELPHIA

A spotty condition existed in the machinery and machine-tool market throughout the Philadelphia area during the last two weeks. Two motor truck manufacturers were in the market recently for some replacement purchases, and those dealing in industrial machinery reported that the level of business had maintained a fairly high mark. There was nothing in the situation that caused any surprise to the dealers or manufacturers.

One manufacturer engaged in the production of a diversified line of machinery and machine tools reported that plant operation is keeping up with orders placed some time ago. The inquiries have shown a spotty condition, those received being from industrial establishments seeking equipment for replacement. Railroad buying continues to be slack, and there appeared to be no activity from the airplane industry during the fortnight.

CHICAGO

Practically no change in machine-tool market conditions is reported for the last week. If anything, there is a trend upward, particularly with reference to inquiries, which are being received in good volume. Bookings are somewhat below those of the first two weeks in October, but a feeling of optimism prevails that the lowest curve for the year has been passed, and that no further recession may be anticipated. As noted a wek ago, the decline in production on the part of automotive and radio plants has had some effect on the sale of certain types of tools. It is now believed that there will be a gradual resumption of productive activity in at least one of these industries. This is indicated by the fact that a Chicago radio manufacturing plant normally employing about 12,000 hands, which closed down a short time ago, has resumed operations with about one-quarter of this force. No new lists are reported from any source. Railroads are buying against necessities only, and the same may be reported regarding manufacturers of farm implements. Demand for used tools is being well maintained at good prices.

DETROIT

Some sales of machinery have been made within the past few days, largely outside of the automobile industry, but machinery and machine-tool sales generally have dropped to lower levels here, and the general atmosphere is not particularly optimistic because of the uncertain condition of the automobile business. Most dealers report that inquiries have fallen to a low point, but many business and industrial leaders believe that conditions will improve within a few weeks. Sales of cars have been dropping off, and the manufacturers are uncertain of the future, but many predict that the first of the year will see a favorable adjustment of the general situation.

Westinghouse Inaugurates New Pension System

Employees of the Westinghouse Electric & Manufacturing Co. who retire at the age of 65 years or older will be guaranteed substantial incomes for the remainder of their lives as the result of the institution of a new annuity payment plan that has none of the objectionable features of the older ones, according to an announcement by Frank A. Merrick, president. The plan affects all of the 50,000 workers on the Westinghouse payroll, and is one of the largest to be installed anywhere. The plan's coverage will be approximately $54,000,000 at the start and $14,500,000 annually thereafter. Under the plan, an employee not only receives a reward for length of service, but is offered an opportunity to buy additional retirement income for himself at a favorable rate.

Business Items

The Stanley Electric Tool Co., New Britain, Conn., has been organized as a subsidiary of the Stanley Works. The company has an authorized capital of $50,000 and lists the following officers: president, L. M. Knouse; vice-president, Cedric Powers; treasurer, L. W. Young; secretary, H. W. Blackman, assistant secretary, J. J. Holloway; directors, Clarence. F. Bennett, James E. Cooper, L. M. Knouse, Cedric Powers, R. E. Pritchard, J. E. Stone and L. W. Young.

The Pacific Oil Tool Co., Ltd., Los Angeles, Calif., in drawing attention to recent changes in the management and personnel responsible for the conduct of its business, announces the following officials: President and manager, Walter T. Wells, formerly with the Union Metal Manufacturing Co., Los Angeles; vice-president, Judge Lee Champion, formerly active in Rocky Mountain fields; secretary and treasurer, Harry E. Hoffer, formerly with Wilson & Willard Manufacturing Co.; sales manager, Otto G. Keil, formerly with the Link-Belt Co.; director, W. G. Lane, formerly with the General Electric Company.

Miller-Schofield, Inc., Los Angeles, Calif., recently formed through the merger of Harry A. Miller, Inc., and Schofield, Inc., of America, has announced the election of the following officers: President, J. J. Doyle; vice-president, G. L. Schofield; secretary, Gad Morgan. Harry A. Miller will be chief engineer. The directorate includes J. C. Haggarty, William Thomas Kester and Maurice DeMond. The board membership will be increased later.

The Stanley Electric Tool Co., subsidiary of The Stanley Works, New Britain, Conn., has purchased the trade name, stock on hand, tools, jigs, fixtures, etc., of the Unishear Co., 270 Lafayette St., New York, N. Y., and will continue manufacture and development at their main plant in New Britain, Conn. Distribution will continue through regular established jobbing channels. Inquiries regarding service, repairs, as well as tools, should be addressed to The Stanley Electric Tool Co., New Britain, Conn.

Federal incorporation has been granted in Canada to the A.C.F. Motors Co. of Canada, Ltd. Headquarters will be at Windsor, Ont. Incorporators are: William F. McDermott, West New Brighton, N. Y.; John L. Farrell, Long Island, N. Y.; Chas. J. Hardy, Jr., Pelham, N. Y.; Edward J. Crowe, Brooklyn, N. Y., and Theodore L. Harrison, Ridgefield Park, New York.

National Airways, Ltd., has been incorporated in Canada, to manufacture and repair aeroplanes and airships, and to manufacture motors, machinery and component parts of flying machines. The company is capitalized at $100,000. Headquarters will be established at Saskatoon, Saskatchewan, with Salvarius Paul Rooney as manager.

The Massey-Harris Co., farm implement manufacturer, has organized an Iowa sales territory in the district formerly served by Frank Wherry, and Mr. Wherry has been appointed division sales manager.

The Black & Decker Manufacturing Co., Towson, Md., has opened a national exhibit at 2337-2339 Boardwalk, Atlantic City, N. J., in which are displayed the company's line of portable electric tools and accessories, the Marschke line of heavy-duty grinders and buffers, the Van Dorn line of portable electric tools and accessories, and the Domestic line of fractional-horsepower universal motors.

The Bersted Manufacturing Co., West Sixty-Fifth St. and Fifty-Second Ave., Chicago, has purchased the property it has been occupying, including a manufacturing building having 40,000 sq.ft. of working space.

The Hammond Machinery Builders, Kalamazoo, Mich., formerly the Hill-Curtis Co., have recently completed an 80x64-ft. addition to their plant, which is to be devoted to manufacturing.

The T. B. Wood's Sons Co., Chambersburg, Pa., has been appointed special distributor for Texrope drives by the Allis-Chalmers Manufacturing Co., Milwaukee.

The Milwaukee Grey Iron Foundry Co., Thirty-ninth Ave., and Mitchel St., Milwaukee, is building a 1-story cleaning room and a core-oven building.

The Eccles & Davies Machinery Co., Inc., 316-320 South San Pedro St., Los Angeles, Calif., has been appointed exclusive agent for the South Bend Lathe Works for Southern California.

The Motor Car Ventilator Corporation, Suffolk, Va., is completing an aluminum foundry. R. G. Ederton is president.

Personals

CARL C. GIBBS, manager of the Indianapolis plant of the National Malleable & Steel Castings Co., Cleveland, has been transferred to Cleveland as assistant to Pres. Henry F. Pope. STOWELL C. WASSON will succeed him at Indianapolis.

NORMAN LEONHARD, superintendent for nine years of the pattern department of the Kissel Motor Car Co., Hartford, Wis., has resigned. He is owner of the Waukesha Pattern Works, and is managing it at the present time.

R. L. COLLIER has been made assistant to Granville P. Rogers, managing director of the Steel Founders' Society of America. He will be located in the offices of the society in New York City.

CARL L. MILLER, factory superintendent of the Capitol Castings Co., Lansing, Mich., for the past 9 years, has been named general manager to succeed the late James J. Carey.

JOHN W. TAMBERT has been appointed secretary and treasurer of the Perfex Corporation, Milwaukee, Wis., to succeed C. G. Phelps, resigned.

JOSEPH P. FLETCHER, manager of the Buffalo office of the Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago, has been appointed manager of the Philadelphia office to succeed the late A. L. Schuhl. W. O. BECKER, who has been working out of the Toronto office, has been named as manager of the Buffalo office.

THOMAS FULLER, formerly manager of the Charlotte, N. C., office of the Westinghouse Electric & Manufacturing Co., has been appointed manager of the Atlanta district office to fill the vacancy caused by the death of H. A. Coles.

GILBERT C. BUDWIG has been appointed director of the newly-created division of licensing and inspection, and HARRY H. BLEE has been appointed director of aeronautic development, of the aeronautics branch of the U. S. Department of Commerce.

H. ROGER MALLEY has been elected vice-president and general manager of Sawyer-Massey, Ltd. Mr. Malley is severing his connection with Canadian Foundries & Forgings, Ltd., as manager of the company's Welland plant, to assume his new appointment.

FRANK E. GRANT has become affiliated with the brake sales department of the Midland Steel Products Co., Cleveland and Detroit. He was formerly assistant factory sales manager of the Gabriel Snubber Manufacturing Co., Detroit.

RALPH H. CLORE has been appointed general sales manager of the United States Electrical Tool Co., Cincinnati. He succeeds GEORGE M. LAWRENCE, who after a number of years as branch manager and general sales manager, resigned to become vice-president of the General Radial Drill Co., also of Cincinnati.

GEORGE V. FOY has been appointed vice-president of the Houde Engineering Corporation, Buffalo, N. Y. He was formerly assistant to Claire L. Barnes, president. Prior to joining the Houdaille Corporation, he was a newspaper financial editor.

ARTHUR C. ALLSHUL, formerly Buffalo plant manager for Joseph T. Ryerson & Son, Inc., has been appointed manager of the new plant in the Phila-

delphia district. Mr. Allshul's transfer follows closely the acquisition of the Penn-Jersey Steel Co., Camden, N. J., by the Ryerson organization.

A. WESLEY WILLIAMS has been appointed to take charge of Canadian sales and service of crawlers for Link-Belt, Ltd., with headquarters at Toronto. Mr. Williams joined the Toronto staff of Link-Belt, Ltd., in 1916.

D. O. REARDON, formerly Iowa representative of the Merchandising division of the Westinghouse Company, is representing the Wagner Electric Corporation, St. Louis, in 64 counties with headquarters in Des Moines.

E. D. COWLIN, formerly New York manager of the Reliance Manufacturing Co., Massillon, Ohio, has been appointed to the general sales managership and will return to the main offices some time about Jan. 1.

BERNARD NAGELVOORT, formerly plant manager of the Murray Corporation of America, has joined The Rotor Air Tool Co. as sales engineer, with headquarters in Detroit.

C. H. REYNOLDS has been appointed Chicago wholesale representative for the Marmon Motor Car Co., Indianapolis. GEORGE B. BANDY, JR., has been appointed district representative for the states of Texas, Oklahoma, New Mexico, Arkansas, and Kansas.

CHARLES F. WILLARD, Los Angeles, is the inventor of a new-type Diesel engine nearing completion there. The new engine will be of the Semi-Diesel type, convertible for gasoline or heavy fuel.

B. F. HAMILTON, superintendent of the Columbus (Ind.) plant of the Noblitt-Sparks Industries of Indianapolis, has been made general superintendent of the three plants of the company, located at Greenwood, Columbus, and Seymour, Ind. DELMAR WORKMAN, Indianapolis, former general manager of the plant of the Diamond Chain Co., is Mr. Hamilton's successor. The change took place Nov. 1.

GLENN MUFFLY, consulting engineer for Copeland Products, Inc., has been appointed to the executive staff of American Cirrus Engines, Inc., a unit of Allied Motor Industries, Incorporated.

IRA B. LANPHIER, Madison, Wis., has been appointed director of the Package Research Laboratory, Rockaway, New Jersey.

GORDON THORNTON has been added to the sales force of the Cleveland branch of the U. S. Electrical Tool Co., Cincinnati.

CLARENCE S. GEDNEY has been appointed manager of the Buffalo plant of Joseph T. Ryerson & Son, Inc., succeeding Arthur C. Allshul. Mr. Ged-

ney has been connected with the specialty sales division of the company in the Chicago territory for many years past.

J. F. ROARK has been appointed district representative in the states of Texas and Louisiana by the Marmon Motor Car Co., Indianapolis.

Obituaries

WILLIAM M. STERNBERG, SR., founder of the Sterling Motor Truck Co., West Allis, Wis., and inventor of steam tractors, automatic threshing machine feeders, a cigar-making machine, and an automatic cork cutter, died at his home in West Allis, Nov. 8, aged 80 years. He founded the Sterling Motor Truck Co., under the name of the Sternberg Truck Co., in 1907.

ROBERT EMMET JENNINGS, pioneer steel manufacturer who was formerly a director of the Gear Grinding Machine Co., Detroit, and a number of other companies, died on Oct. 30 at his home in Montclair, N. J. He was 84 years of age.

RICHARD CUSHMAN, 41, a director, and formerly president, of the Cushman Chuck Co., Hartford, Conn., died Nov. 10 at the Lawrence Memorial Hospital following a six weeks' illness. He was grandson of the late A. F. Cushman, who founded the Cushman Company.

HENRY AYLETT COLES, Atlanta district manager of the Westinghouse Electric & Manufacturing Co., died recently in New Orleans, La., of heart failure. A veteran in the Westinghouse organization, he had joined the company while its plant was located in Garrison Alley, Pittsburgh.

O. B. WOODROW, 49, formerly of Newton, Iowa, said to be inventor of the electric washing machine, and with H. L. Ogg, organizer of the Automatic Washer Co., Newton, died Nov. 6 in Seattle, Wash., where he had lived the past two years.

CLARENCE R. CRAIN, 38, superintendent of the Mattison Machine Works, Rockford, Ill., and president of the Rockford branch of the A.S.S.T., died Oct. 29 after an illness of two months.

ROBERT BURNS, machinery manufacturer and former president of the Jabez Burns Co., New York, died on Nov. 11 at his home in New York City. He was 72 years of age.

HENRY W. MILMINE, formerly president and manager of Milmine & Co., Toledo, Ohio, died recently after an extended illness.

EDWARD P. BAIRD, 69, president of the Baird Lock Co., Chicago, died recently at his home in Evanston, Illinois.

C. S. TRENCH, 75, metal authority and editor of *The American Metal Market*, died on Nov. 8 in Brooklyn, New York.

WILLIAM B. CAREY, 50, vice-president of the Fisher Machine & Tool Co., Buffalo, died suddenly on Nov. 10.

JOSEPH C. AUSTERBERRY, 63, died on Oct. 28 in Detroit. He had been a dealer in milling machines and other types of machinery since 1912.

RICHARD H. TYNER, 61, president of the National Marking Machine Co., Cincinnati, died unexpectedly on Oct. 24.

Forthcoming Meetings

AMERICAN SOCIETY OF MECHANICAL ENGINEERS — Annual meeting, New York, Dec. 2 to 6. Headquarters will be at 29 W. 39th St., New York City. Calvin W. Rice is secretary.

STEEL FOUNDERS' SOCIETY OF AMERICA—Regular meeting, Pittsburgh, Pa., Dec. 12. Details may be obtained from the Executive offices, 932 Graybar Bldg., New York City.

THE WEEKLY PRICE GUIDE . . .

Rise and Fall of the Market

ALL price changes of the last week were declines, making two successive weeks in which this has occurred. Non-ferrous materials alone were affected, steel and iron prices remaining unchanged with buying slow. The downward trend is noted in tin, lead, zinc, solder, babbitt metal, scrap non-ferrous metals, linseed oil and coke. Materials stocks at mills and warehouses are small, this condition acting as a safeguard against drastic price declines. In steel, automotive buying is at a standstill; pipe shows but little activity; railway and agricultural implement material, shapes and plates are moving in seasonal volume.

(All prices as of Nov. 15, 1929)

IRON AND STEEL

PIG IRON—Per gross ton, f.o.b:

CINCINNATI	
No. 2 Southern (silicon 1.75@2.25)	$17.69@$18.19
Northern Basic	19.90
Southern Ohio No. 2	19.90
NEW YORK—Tidewater Delivery	
No. 2 Southern (silicon 1.75@2.25)	19.50
BIRMINGHAM	
No. 2 Foundry (silicon 1.75@2.25)	14.00@14.50
PHILADELPHIA	
Eastern Pa., No. 2x (silicon 2.25@2.75)	21.26@21.76
Virginia No. 2	24.04
Basic	19.75@20.25
CHICAGO	
No. 2 Foundry, local (silicon 1.75@2.25)	20.00
No. 2 Foundry, Southern (silicon 1.75@2.25)	20.01
PITTSBURGH, including freight charge ($1.76) from Valley:	
No. 2 Foundry	20 26
Basic	20 26
Bessemer	20.76

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb:

Detroit	4.50
Cleveland	5.00
Cincinnati	4.50
New York	5.25
Chicago	4.50@4.75

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots:

Blue Annealed*	Pittsburgh Mill Base	Chicago	Cleveland	New York
No. 10	2.10@2.20	3.35	3.30	3.90†
No. 12	2.15@2.25	3.45	3.35	3.95†
No. 14	2.25@2.35	3.55	3.45	4.00†
No. 16	2.35@2.45	3.65	3.55	4.10†
Black				
Nos. 18 to 20	2.55	3.85	3.70	3.80
No. 22	2.70	4.00	3.85	3.95
No. 24	2.75	4.05	3.90	4.00
No. 26	2.85	4.15	4.00	4.10
No. 28	3.00	4.75	4.15	4.25
Galvanized				
No. 10	2.80	4.20	4.05	4.05
Nos. 12 to 14	2.90	4.30	4.15	4.15
No. 16	3.00	4.40	4.25	4.25
No. 18	3.15	4.55	4.40	4.40
No. 20	3.30	4.70	4.60	4.55
No. 22	3.35	4.75	4.65	4.60
No. 24	3.50	4.90	4.75	4.75
No. 26	3.75	5.15	5.00	5.00
No. 28	4.00	5.40	5.25	5.25

*Light plates. †Up to 3,999 lb.

WELDED STEEL PIPE—Warehouse discounts are as follows:

	New York		Cleveland		Chicago	
	Black	Galv.	Black	Galv.	Black	Galv.
1 to 3 in. butt	53.74%	41.2%	55.5%	43.5%	55.5%	42.5%
3½ to 6 in. lap	50.32%	37.78%	53.5%	40.5%	51.6%	39.0%

WROUGHT-STEEL PIPE LIST

Size, Inches	List Price per Foot	Diameter in Inches—External	Diameter in Inches—Internal	Thickness Inches
1	$0.17	1.315	1.049	.133
1¼	.23	1.66	1.38	.14
1½	.27½	1.9	1.61	.145
2	.37	2.375	2.067	.154
2½	.58½	2.875	2.469	.203
3	.76½	3.5	3.068	.216
3½	.92	4.0	3.548	.226
4	1.09	4.5	4.026	.237
5	1.48	5.563	5.047	.258
6	1.92	6.625	6.065	.28
8	2.50	8.625	8.071	.277

SEAMLESS STEEL TUBING—Following net prices are for seamless mechanical tubing, cold drawn, round, .10 to .30 carbon, at New York warehouse in lots of less than 100 ft. or 100 lb:

Thickness—B.w.g. and Decimal Fractions		Outside Diameter in Inches—Price per Foot ¼	⅜	½	⅝	¾	1	1¼	1½
.035″	20	$0.15	$0.16	$0.17	$0.18	$0.19	$0.21	$0.23	
.049″	18	.17	.18	.19	.20	.21	.23	.25	
.065″	16	.19	.20	.21	.22	.23	.25	.27	
.083″	14	.20	.22	.23	.24	.25	.27	.29	
.095″	13	.21	.23	.25	.26	.27	.29	.31	
.109″	12	.22	.24	.26	.27	.28	.30	.32	
.120″ or .125″	11	.23	.25	.27	.28	.29	.31	.33	
.134″	10	.24	.26	.28	.29	.30	.32	.34	

MISCELLANEOUS—Warehouse base prices in cents per lb:

	New York	Cleveland	Chicago
Spring steel, light*	4.50	4.65	4.65
Spring steel, heavier	4.00	4.00	4.00
Coppered Bessemer rods	6.05	6.00	6.20
Hoop steel	4.25†	4.00	4.15
Cold rolled strip steel	6.25	6.00	6.10
Floor plates	5.10†	5.30	5.00
Cold drawn, round or hexagon‡	3.60	3.65	3.60
Cold drawn, flat or square‡	4.10	4.15	4.10
Structural shapes	3.30†	3.00	3.10
Soft steel bars	3.25†	3.00	3.00
Soft steel bar shapes	3.25†	3.00	3.00
Soft steel bands	3.75†	3.65	3.65
Tank plates	3.30†	3.00	3.10
Bar iron (2.75 at mill)	3.25	3.00	3.00
Drill rod (from list)	60%	55%	50%

*Flat, $\frac{3}{16}$-in. thick. †Up to 3,999 lb., ordered and released for shipment at one time. ‡Cold finished steel, shafting and screw stock.

Electric welding wire at New York warehouse— $\frac{3}{32}$, 8.35c. per lb.; $\frac{1}{8}$, 7.85c. per lb.; $\frac{5}{32}$ to $\frac{1}{2}$, 7.35c. per lb.

METALS

Warehouse Prices in Cents Per Pound for Small Lots:

Copper, electrolytic, New York			19.25
Tin, Straits, pigs, New York			42.50@43.50
Lead, pigs, E. St. Louis	6.10	New York	7.25@7.75
Zinc, slabs, E. St. Louis	6.25	New York	7.50@8.00

	New York	Cleveland	Chicago
Antimony, slabs	10.50@11.00	11.50	14.50
Copper sheets, base	27.75	27.75	27.75
Copper wire, mill, base	20.12½	20.12½	20.12½
Copper, drawn, round, base	26.25	26.25	26.25
Copper tubing, base	29.25	29.25	29.25
Brass sheets, high, base	23.25	23.25	23.25
Brass tubing, high, base	28.25	28.25	28.25
Brass rods, high, base	21.25	21.25	21.25
Brass wire, high, base	23.75	23.75	23.75

SHOP MATERIALS AND SUPPLIES

METALS—Continued

	New York	Cleveland	Chicago
Aluminum ingots, 99%.....	25@26	24.30	24.30
Zinc sheets (casks).....	10.75@11.25	12.25	10.11
Solder (½ and ½).....	29.75	29.75	31.00
Babbitt metal, delivered in case lots, New York, cents per lb:			
Genuine, highest grade.....			56.00
Commercial genuine, intermediate grade.....			42.00
Anti-friction metal, general service.....			31.00
No. 4 babbitt.....			11.50

NICKEL AND MONEL METAL—Price in cents per lb., base, f.o.b. Huntington, W. Va:

	Nickel	Monel Metal
Sheets, full finished.....	52.00	42.00
Sheets, cold rolled.....	60.00	50.00
Strip, cold rolled.....	55.00	45.00
Rods, hot rolled.....	45.00	35.00
Rods, cold drawn.....	53.00	40.00
Tubing	75.00*	90.00†
Angles, hot rolled.....	50.00	40.00
Plates.....	52.00	42.00

*Seamless. †Welded.

OLD METALS—Dealers' purchasing prices in cents per pound, f.o.b. cars, depending on quantity offered for sale:

	New York	Cleveland	Chicago
Crucible copper.....	14.50 @15.00	13.50	13.00 @14.00
Copper, heavy, and wire..	13.75 @14.25	13.00	12.00 @13.00
Copper, light, and bottoms	12.25 @12.75	12.50	11.00 @12.00
Heavy lead.....	4.62½@ 5.12½	6.25	4.75 @ 5.25
Tea lead.....	3.12½@ 3.37½	4.25	3.75 @ 4.25
Brass, heavy, yellow.....	8.00 @ 8.25	8.00	8.00 @ 8.50
Brass, heavy, red.....	11.75 @12.25	12.50	11.75 @12.25
Brass, light.....	6.75 @ 7.00	7.50	7.00 @ 7.50
No. 1 yellow rod turnings.	8.75 @ 9.25	9.00	9.00 @ 9.50
Zinc.....	2.75 @ 3.25	3.25	3.00 @ 3.25

TIN PLATES—Charcoal—Bright—Per box:

	New York	Cleveland	Chicago
"AAA" Grade:			
IC, 14x20.....	$12.10	$11.95	$11.50
"A" Grade:			
IC, 14x20.....	9.70	9.90	9.50
Coke Plates—Primes—Per box:			
100-lb., 14x20.....	6.45	6.10	7.00
Terne Plates—8-lb. Coating—Small lots—Per box:			
IC, 14x20.....	7.75@8.00	7.00	7.50

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb..	$0.13*	$0.16	$0.15
Cotton waste, colored, per lb..	.09½*	.12	.12
Wiping cloths, washed, white, per lb.....	.12½	38.00 per M	.16
Sal soda, per lb.....	.02½	.02	.02
Roll sulphur, per lb.....	.027	.03½	.04
Linseed oil, raw, in 1 to 4 bbl. lots, per lb.....	.153	.164	.163
Cutting oil, about 25% lard, in 5 gal. cans, per gal.....	.65	.60	.65
Machine oil, medium-bodied (55 gal. steel bbl.) per gal..	.33	.36	.24
Belting — Present discounts from list in fair quantities (½ doz. rolls) for leather or rubber:			
Leather—List price, 24c. per lin. ft., per inch of width, for single ply:			
Medium grade.....	30–10%	30–10%	35%
Med. grade, heavy wgt...	30%	30– 5%	30%
Rubber transmission, 6-in., 6 ply, $1.83 per lin.ft:			
First grade.....	50%	50–10%	50%
Second grade.....	60%	60– 5%	50–10%

*Grade F.

Comparative Warehouse Prices

New York	Unit	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars.....	per lb..	$0.0325	$0.0325	$0.0325
Cold drawn shafting...	per lb..	.036	.036	.034
Brass rods.....	per lb..	.2125	.2125	.1825
Solder (½ and ½).....	per lb..	.2975	.32	.35
Cotton waste, white...	per lb..	.13	.13	.10@.13½
Disks, aluminum oxide mineral, cloth, No. 1, 6-in. dia.....	per 100.	4.60	4.60	3.59
Lard cutting oil.....	per gal.	.65	.75	.65
Machine oil.....	per gal.	.33	.33	.30
Belting, leather, medium.....	off list..	30–10%	30–10%	30–10%
Machine bolts, up to 1x30 in., full kegs...	off list..	50-10%*	50–10%*	50%*

*List prices as of April 1, 1927.

MISCELLANEOUS—Continued

	New York	Cleveland	Chicago
Abrasive materials — Standard grade, in sheets 9x11 in., No. 1, per ream of 480 sheets:			
Flint paper*.....	$5.94	$5.94	$5.94
Emery cloth*.....	26.40	26.40	26.40
Disks, aluminum oxide mineral, 6 in. dia., No. 1, per 100:			
Paper†.....	2.65	2.61	2.61
Cloth†.....	4.60	4.59	4.59
Fire clay, per 100 lb. bag.....	1.00	.75	.75
Coke, prompt furnace, per net ton.....	Connellsville, 2.65@2.75		
Coke, prompt foundry, per net ton.....	Connellsville, 3.50@4.85		
White lead, dry.....	100 lb. kegs ...	New York, 13.75	
White lead, in oil.....	100 lb. kegs....	New York, 14.25	
Red lead, dry.....	100 lb. kegs....	New York, 13.75	
Red lead, in oil.....	100 lb. kegs....	New York, 15.25	

*Less than 3 reams. †Less than 200.

SHOP SUPPLIES

Discounts from new list dated Apr. 1, 1927, applying on immediate deliveries from warehouse stocks in New York and vicinity:

Machine bolts:	
Up to ¾-in. x 6-in., full kegs, list less.....	60%
Larger, up to 1 x 30-in., full kegs, list less.....	50–10%
Less than full kegs or case lots, add to list.....	10%
Fitting-up bolts: list less.....	45%
Lag screws:	
Up to ½-in. x 6-in., list less.....	60%
Larger, list less.....	50–10%
Less than full keg or case lots, add to list.....	10%
Rivets:	
Structural, round head, full kegs, net.....	$4.50
Structural, round head, broken kegs, net.....	6.00
Tank, $\frac{7}{16}$-in. dia. and smaller, list less.....	60%
Nuts:	
Hot pressed, square or hexagonal, blank or tapped:	
Full kegs up to 1-in., incl., list less.....	60%
Larger, up to 3-in., list less.....	40–10%
Less than keg or case lots, add to list.....	10%
Washers:	
Wrought, full kegs, per 100 lb., list less.....	$4.00
Wrought, broken kegs, per 100 lb., list less.....	2.00
Turnbuckles:	
With stub ends, list less.....	20%
Without stub ends, list less.....	50%
Chain:	
Proof coil, base, per 100 lb., net.....	$7.10
Cast iron welding flux, per lb., net.....	.40
Brazing flux, per lb., net.....	.80

MACHINE REQUIREMENTS AND INDUSTRIAL CONSTRUCTION

Equipment Wanted

Ind., Fort Wayne — C. N. Braun Machinery Co., 1830 South Lafayette St.—Morgan or Doig nailing machine, open back pattern.

Ky., Louisville—W. P. Brown & Sons Lumber Co., 2531 South 4th St.—material handling crane, etc., for proposed wood preserving plant at Highland Park.

Mich., Detroit—Dept. of Purchases & Supplies, 735 Randolph St., J. E. Mills, Comr.—one No. 156 Yates 20 in. ball bearing planer.

Mo., Valley Park—Barbour Boat Works—power rolls of 5-16 capacity sheets 4 ft. wide.

Ont., Hamilton — Coffield Washer Co., 80 Park St. N.—complete equipment for the manufacture of electric washing machines for proposed 1 story, 60 x 300 ft. factory on Niagara St. Estimated cost $100,000.

Ont., Hamilton—Steel Trough & Machine Co. Ltd., Tween—equipment for the manufacture of various lines of steel equipment, for proposed factory on Dunbar St., here. Estimated cost $50,000.

Opportunities for Future Business

Calif., Compton—Pacific Iron & Steel Co., 241 East Ave. 26th, Los Angeles, plans the construction of a 1 and 2 story factory here. Estimated cost $250,000.

Calif., Pittsburg—Minerals Increment Co., J. R. McInerny, Pres., 1400 East 6th St., Los Angeles, plans the construction of first unit of factory for the manufacture of "lighter-than-air" steel under a German patent here. Estimated cost to exceed $100,000.

Calif., San Diego—San Diego State Teachers College, is having plans prepared for a 2 story training school, including shop, etc. Estimated cost $130,000. G. B. McDougall, Public Works Bldg., Sacramento, is state architect.

Calif., Scotia—Pacific Lumber Co. awarded contract for the construction of a dry kiln and dried lumber storage shed. Estimated cost $350,000.

Colo., Pueblo—Christy Mfg. Co., c/o A. B. Christy, Vail Hotel, is having plans prepared for the construction of a factory for the manufacture of juvenile furniture. Estimated cost $150,000.

Conn., Branford—J. Zdanaowicz, 48 Main St., awarded contract for the construction of a 1 story, 50 x 100 ft. repair and service garage. Estimated cost $40,000.

Conn., Bridgeport—E. W. Carpenter Mfg. Co., 1565 Railroad Ave., subsidiary Acme Shear Co., 82 Hicks St., awarded contract for a 1 story, 50 x 150 ft. factory for the manufacture of loose-leaf devices, knife sharpeners and similar articles. Estimated cost $40,000.

Ill., Chicago—Belden Mfg. Co., 4625 West Van Buren St., manufacturers of insulated wire, awarded contract for a 2 story, 68 x 132 ft. factory, etc.

Ill., Chicago—Sloan Valve Co., 4300 West Lake St., awarded contract for a 3 story, 124 x 135 ft. factory for the manufacture of plumbing goods, at 4350-58 West Lake St. Estimated cost $100,000.

Ind., Connersville—Corman Aircraft Corp. of Indiana, E. W. Ryan, Res. Dir., owned and controlled by Cord Corp., plans the construction of a factory for the manufacture of trimotor transport planes.

Ia., Shopton—Atchison, Topeka & Santa Fe R.R., Topeka, Kan., awarded contract for addition to engine and additional shop facilities here. Estimated cost $65,000. H. W. Wagoner, Ch. Engr. Eastern Div.

Ky., Louisville — Brown Wood Preserving Co., subsidiary of W. P. Brown & Sons Lumber Co., J. G. Brown, Pres., 2531 South 4th St., plans the construction of a creosoting plant at Ashbottom Rd. and Highland Park. Estimated cost $2,500,000.

Mass., Belmont (Boston P. O.)—C. Fulginiti, 101 Hull St., awarded contract for a 1 story, 40 x 140 ft. repair and service garage on Trapelo Rd. Estimated cost $40,000. Private plans. Noted July 4.

Mass., Belmont (Boston P. O.) — John O'Connor, 14 Munroe Terrace, Dorchester, is having plans prepared for a 1 story, 60 x 120 ft. garage and repair shop on Trapelo Rd. Estimated cost $40,000.

Mass., Cambridge (Boston P. O.)—Cambridge Salvage & Supply Co., 91 Broadway, is having plans prepared for a 2 story, 100 x 165 ft. factory at Broadway and Jordan Pl. Estimated cost $70,000. N. R. Willard, 401 Massachusetts Ave., Arlington, Archt.

Mass., Winchendon—General Box Co., is receiving bids for a 2 story, 60 x 160 ft. addition to factory. Thompson & Lichtner Co., Inc., Statler Bldg., Boston, Engrs. Noted Nov. 14.

Mass., Winchester—A. T. Nelson, 1 Federal St., Boston, will build a 1 story repair and service garage on Common St. here. Estimated cost $40,000. Private plans.

Mich., Lansing—Fisher Body Corp., General Motors Bldg., Detroit, is having plans prepared for a 2 story, 72 x 450 ft. automobile body plant. Estimated cost $250,000. Private plans.

Minn., Minneapolis — General Electric Co., Schenectady, N. Y., V. A. Wolcott, Dist. Mgr., 530 First National-Soo Line Bldg., Minneapolis, plans the construction of a 2 story, 80 x 160 ft. service shop, 4 story, 80 x 160 ft. warehouse, etc. here. Estimated cost $500,000. Private plans.

N. J., Jersey City—I. Gilman Corp., c/o C. M. Eagen, 15 Exchange Pl., is having preliminary sketches made for a 6 story garage at 645-647 Pavonia Ave. Estimated cost $150,000. Architect not announced.

N. J., Manville—Johns-Manville Corp., 41st St. and Madison Ave., New York, manufacturers of asbestos products, awarded contract for addition to factory here. Estimated cost $300,000.

N. J., Newark—A. Rossman, 277 Parker St., awarded contract for a 1 story, 105 x 175 ft. garage at 551-555 Ridge St. Estimated cost $150,000.

N. Y., Brooklyn — Keystone Foundry Co., awarded contract for the construction of a foundry and industrial building at Wortman Ave. and Essex St. Estimated cost $45,000. Noted Nov. 14.

N. Y., Brooklyn — M. Levine, 376 Throop Ave., is receiving bids for a 131 x 200 ft. garage at Vanderbilt and Willoughby Aves. Estimated cost $75,000. H. J. Nurick, 44 Court St., Archt. Noted Nov. 14.

N. Y., Brooklyn — F. A. Lundquist, 1516 Emmons St., will soon receive bids for a 1 story, 93 x 166 ft. garage at 15th St. and Emmons Ave. Estimated cost $45,000. E. M. Adelsohn, 26 Court St., Archt. Noted Sept. 19.

N. Y., Brooklyn—S. Smigel, 70 Madison Ave., plans the construction of a 2 story, 110 x 264 ft. garage at Bedford and Tilden Aves. Estimated cost $100,000. S. L. Malkind, 93 Court St., Archt.

N. Y., Flushing—New York City Airport, Inc., c/o L. Hallern, 63 Broadway, will receive bids about Feb. 1 for the construction of an airport including hangars, administration building, machine shop, airplane service plant. Estimated cost $1,000,000.

N. Y., Long Island City—Scott Welded Products Co., Bonafide Bldg., had plans prepared for the construction of a 50 x 95 ft. welding shop at Van Alst and Harris Aves. Estimated cost $40,000.

N. Y., Long Island City—R. R. and T. Steele, 482 Vernon Blvd., will build a machine shop at Vernon Blvd. and Rogers St. Van Wart & Wein, 347 Madison Ave., New York, Archts. Noted Nov. 7.

N. Y., Brooklyn — Forbush Realty Co., S. Rubin, Pres., 150 Broadway, New York, awarded contract for the construction of a garage at Broadway and West Johnson Ave. here. Estimated cost $40,000. E. M. Adelsohn, 26 Court St., Archt. Noted Sept. 19.

N. Y., New York—J. S. and D. S. Rearden Realty Co., 80 Wall St., is receiving bids for the construction of a garage at 269 South St. Estimated cost $40,000. L. A. Shemart, 194 Bowery, Archt. Noted June 20.

N. Y., New York—J. Miller, Pres. Borough of Manhattan, Municipal Bldg., will receive bids until Nov. 20 for addition to machine shop and garage at Municipal Asphalt Plant, Avenue A., East 90th and East 91st Sts.

N. Y., New York—W. E. Rodesta & L. A. Cuneo, 41 West 8th St., awarded contract for an 8 story, 67 x 99 ft. garage at 12-16 East 13th St. Estimated cost $100,000. Noted Oct. 3.

N. Y., Woodhaven (br. Jamaica)—A. S. Kossack, 101 Jamaica Ave., Jamaica, is receiving bids for the construction of a garage on 87th St., here. Estimated cost $50,000. E. M. Adelsohn, 26 Court St., Archt.

N. Y., Yonkers—Gerbelet Holding Corp., A. Perlman, Pres., 735 West Farms Rd., awarded contract for the construction of a 2 story garage at 329 South Broadway. Estimated cost $100,000.

O., Berea—Ohio Nut & Bolt Co., 600 Front St., is having preliminary plans prepared for a 1 story, 44 x 161 ft. addition to factory. Estimated cost $50,000. John Woodhouse Bagley, 1706 Euclid Ave., Archt.

O., Cleveland — New York, Chicago & St. Louis R.R., Terminal Tower, awarded contract for a 1 story, 22 x 165 ft. car repair shop on East 55th St. Estimated cost $40,000. A. C. Harvey, Ch. Engr. Noted Nov. 7.

O., Cleveland — Sinclair Automobile Service Corp., c/o H. L. Nelson, 2540 West 22nd St., Chicago, Ill., awarded contract for the construction of a group of automobile service buildings including 27 x 120 ft. service station, 27 x 256 auto repair shop, 100 x 115 ft. boiler house, etc. at 7404 Euclid Ave. Estimated cost $150,000.

O., Cleveland—J. C. Virden Co., 6009 Longfellow Ave., awarded contract for the construction of a 2 story addition to factory for the manufacture of electric goods. Estimated cost $50,000.

Okla., Britton—Curtiss Flying Service Inc., 27 West 57th St., New York, N. Y., awarded contract for the construction of a 1 story, 127 x 143 ft. hangar and service building here. Estimated cost $120,000.

Okla., Muskegee—DeCamp Consolidated Glass Casket Co. Inc., W. C., DeCamp, Pres., will build a 2 story, 75 x 150 ft. addition to factory. Estimated cost $40,000. H. H. Niemann, 710 Barnes Bldg., Archt.

Pa., Jeannette—Semler Co., H. Semler, Jr., awarded general contract for a 1 story, 50 x 120 ft. addition to foundry in Westmoreland Co. Estimated cost $12,000.

Pa., Philadelphia — Gimbel Bros., 9th and Market Sts., will receive bids about Dec. 1, for a 2 story garage at Hamilton and 21st Sts. Estimated cost $175,000. Abbott Merkt & Co., 178 5th Ave., New York, N. Y., Archts. Noted Nov. 14.

Pa., Titusville—Titusville Iron Works, J. T. Dillon, Sr., Pres. and Gen. Mgr., is having revised plans prepared for the construction of a 1 and 2 story, 50 x 150 ft. wash house and foundry. Estimated cost $200,000. Former contract recinded. Noted Sept. 26.

Tenn., Kingsport—American Cyanamid Co., 535 5th Ave., New York, N. Y., Mr. Stowell, Ch. Engr., plans the construction of an electrochemical plant here. Private plans.

Va., Newport News—Horace E. Dodge Corp., awarded contract for the construction of a factory and boat storage building. Estimated cost $150,000. Noted Nov. 7.

Vt., Burlington—Hiagh Lumber Co., is having plans prepared for the construction of a 2 story, 65 x 102 ft. woodworking factory. Estimated cost $60,000. F. L. Austin, College St., Archt.

Vt., Rutland — S. D. Cootey, 40 Washington St., awarded contract for a 2 story, 65 x 150 ft. repair and service garage on West St. Estimated cost $60,000.

Wash., Seattle — National Veneer Products Corp., plans the construction of first unit of plant for the manufacture of box shooks and veneer products. Estimated cost $55,000.

Wis., West Allis—Milwaukee Electric Crane & Mfg. Co., plans the construction of a 1 story, 50 x 75 ft. addition to structural department of plant, also remodeling old building for storage purposes.

Ont., Ojibway—Canadian Steel Co. Ltd., W. B. Perley, Pres., is having plans prepared for the construction of a tin plate mill, also power house and plant for galvanizing black sheets. Estimated total cost $1,500,000.